

CORPORATE ENVIRONMENTAL SERVICES

AIR PROGRAMS REPORT

*NITROGEN OXIDES - BEST
AVAILABLE CONTROL
TECHNOLOGY DETERMINATION
SOURCE EMISSION TEST #1*

POLK POWER GENERATING STATION

AIRS # 1050233

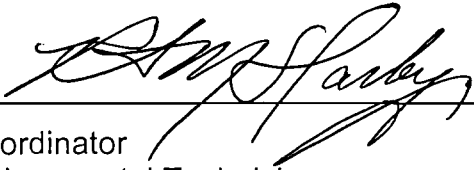
*UNIT NO. 1 COMBUSTION TURBINE &
HEAT RECOVERY STEAM GENERATOR
FIRED ON SYNGAS*

OCTOBER 14, 1999

*Prepared by Tampa Electric Company
Corporate Environmental Services
November 5, 1999*

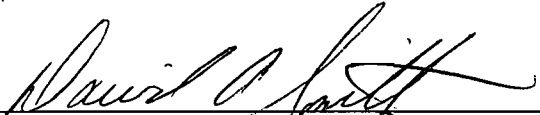
REPORT CERTIFICATION

I have calculated and reviewed all data in this report, and hereby certify that the test report is authentic and accurate to the best of my knowledge.

Date 11/9/99 Signature 

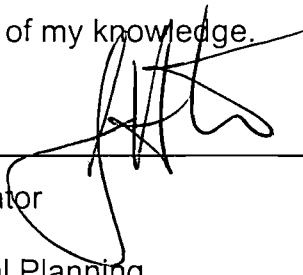
QA/QC Coordinator
Senior Environmental Technician
Air Services and Auditing
Corporate Environmental Services
Tampa Electric Company

The sampling and analysis performed for this report were carried out under my direction, and I hereby certify that this test report is authentic and accurate.

Date 11/9/99 Signature 

Test Team Leader
Senior Environmental Technician
Air Services and Auditing
Corporate Environmental Services
Tampa Electric Company

I have reviewed the testing details and results in this report, and hereby certify that the test report is authentic and accurate to the best of my knowledge.

Date 11/10/99 Signature 

Air Administrator
Air Programs
Environmental Planning
Tampa Electric Company

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1.0 SUMMARY OF RESULTS

On October 14, 1999, Corporate Environmental Services, Air Services and Auditing group of Tampa Electric Company performed source emission tests on IGCC Unit No. 1 at the Polk Power Electrical Generating Station. The combustion turbine was fired with syngas from a coal gasification system. This was the initial bi-monthly testing conducted to satisfy requirements in Title V permit no. 1050233-001-AV for NO_x Best Available Control Technology (BACT) determinations. Testing was performed according to USEPA test methods stipulated in 40 CFR Part 60, Appendix A.

The Nitrogen Oxides (NO_x) emission rate was derived from three test runs. The calculated average was 17 ppm corrected to 15% oxygen on a dry basis.

During the tests on October 14, 1999, Unit No. 1 Combustion Turbine was operated at an average load of 191 megawatts. Details of turbine operation are included in Appendix B.

2.0 SOURCE DESCRIPTION/TEST PROCEDURES

Polk Power Electrical Generating Station is located at County Road 630 approximately 13 miles southwest of Bartow, Polk County, Florida. Unit No. 1 is a IGCC generating unit, 192 MW capacity when fired with Syngas fuel. The source sampling location consists of a circular stack 19 ft. in diameter with four sample ports located 90° apart on the stack circumference. A diagram of the stack sampling location is included in Figure 1 and 2 along with other pertinent information on the test site.

Nitrogen Oxides sampling was performed in accordance with USEPA Reference Method 20 (40 CFR Part 60, Appendix A) "Determination of Nitrogen Oxides, Sulfur Dioxide, and Diluent Emissions from Stationary Gas Turbines". Testing was performed using a Thermo Environmental Model 10 A/R Chemiluminescent NO-NO_x Gas Analyzer. Details of fuel bound nitrogen is found in Appendix B.

Diluent sampling was performed in accordance with USEPA Reference Method 3-A (40 CFR Part 60, Appendix A), "Determination of Oxygen and Carbon Dioxide concentrations in Emissions from Stationary Sources (Instrumental Analyzer Procedure)". Testing was performed using a Servomex 1400 B Oxygen Analyzer.

TCEMS Description

The following discussion briefly outlines the operation principles of Corporate Environmental Services Transportable Continuous Emissions Monitoring System (TCEMS). Additional information on instrument operation may be found in the individual instrument manuals provided by the manufacturers. A schematic of the TCEMS set-up is presented in Figure 3.

Servomex Model 1400 B O₂ Analyzer

The Servomex 1400B oxygen analyzer measures the paramagnetic susceptibility of the sample gas by means of a magneto-dynamic type measuring cell.

Thermo Environmental Instruments Model 10A/R NO/NO_x Analyzer

The Thermo Environmental Instruments model 10A/R NO/NO_x analyzer automatically and continuously determines the concentration of nitric oxide (NO) and/or oxides of nitrogen (NO_x) in a flowing gas mixture. The analytical technique is chemiluminescence.

To measure NO concentrations, the gas sample to be analyzed is blended with ozone (O₃) in a reaction chamber. The resulting chemiluminescence activity is monitored through an optical filter by a high sensitivity photomultiplier tube positioned at one end of the chamber.

This filter and photomultiplier combination responds to light of a narrow wavelength band unique to the NO/O₃ reaction, producing an interference free signal. The output from the photomultiplier is linearly proportional to the NO concentration.

To measure NO_x concentrations (i.e., NO plus NO₂), the sample gas flow is diverted through a NO₂-to-NO converter. The chemiluminescent action in the reaction chamber to the converter effluent is linearly proportional to the NO_x concentration entering the converter.

Data Acquisition System

The data acquisition system (DAS) developed by Entropy Environmentalists Inc., uses a portable personal computer with an internal 32 bit analog-to-digital converter with an external 16 channel multiplexer. In addition to providing an instantaneous display of analyzer responses, the DAS can average data, calculate emission rates, and document analyzer calibrations. The test results and calibrations are stored on the hard disk and printed on a dot matrix printer.

TCEMS Sample Handling System

The extractive monitors utilized in the TCEMS require that the effluent stream be conditioned to eliminate any possible interference (i.e., water vapor and particulate matter), before being transported and injected into each analyzer. Figure 3 depicts a schematic of the entire sample handling system. The major components of this system are listed below:

- Gas transport tubing
- Moisture removal system
- Sampling pump

Gas Transport Tubing

Two separate 1/4 inch O.D. Teflon tubes were used for the sample gas transport.

Moisture Removal System

The moisture removal system was comprised of an ice bath condenser, constructed of a 30-foot section of 3/8 inch O.D. Teflon tubing wrapped in a 12-inch coil. Effluent travels through this coil and then passes, in series, through two stainless steel moisture traps where the condensate drops out and is removed via a condensate discharge pump. With the exception of the discharge pump, the entire assembly is chilled in an ice bath.

Sampling Pump

The Thomas Model 2107CE20-TFE pump is used to transport the effluent sample through the conditioning system to the analyzers. All internal parts of the pump that come into contact with the gas sample are constructed of 316 stainless steel or Teflon.

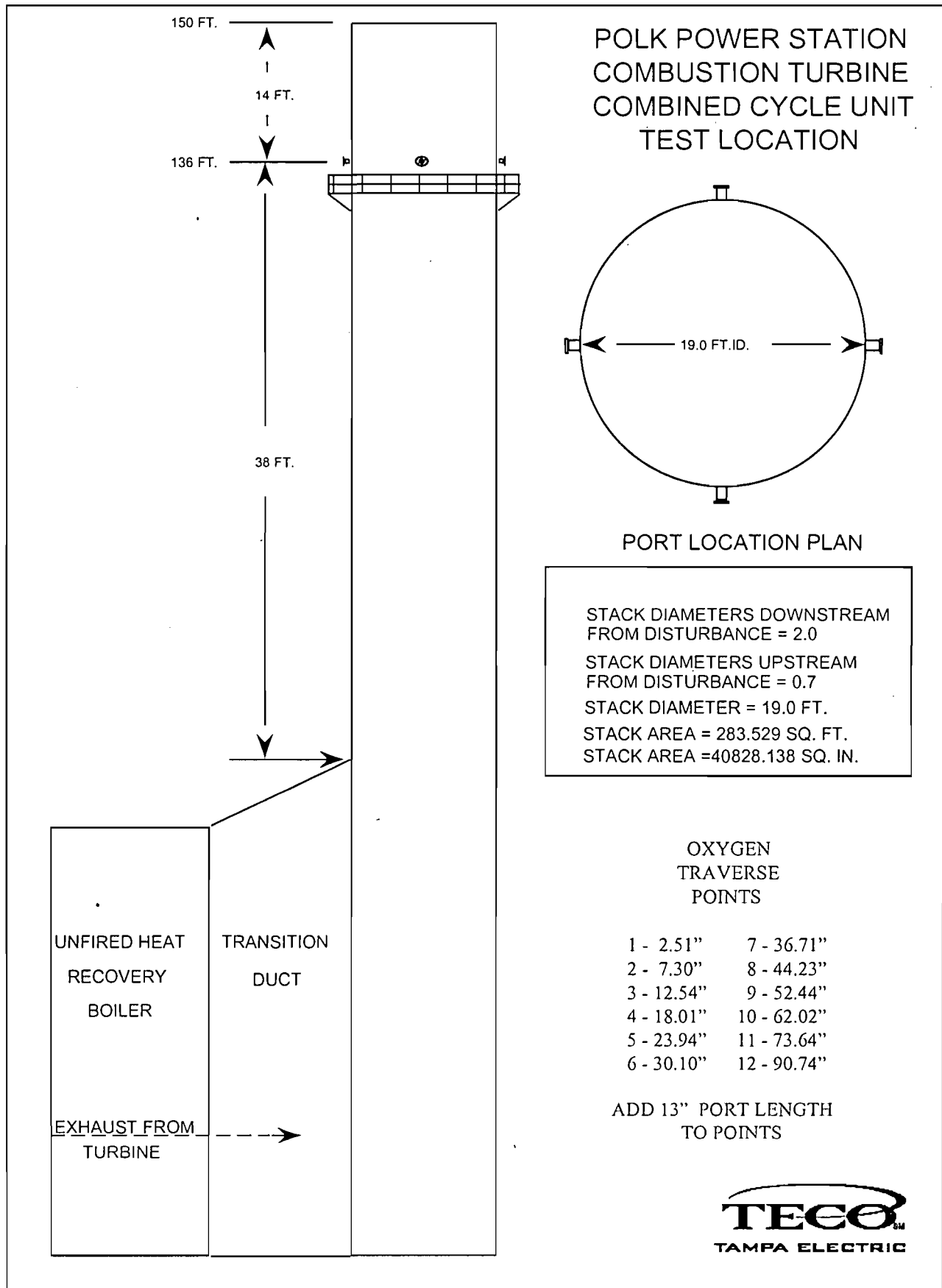


FIGURE 1

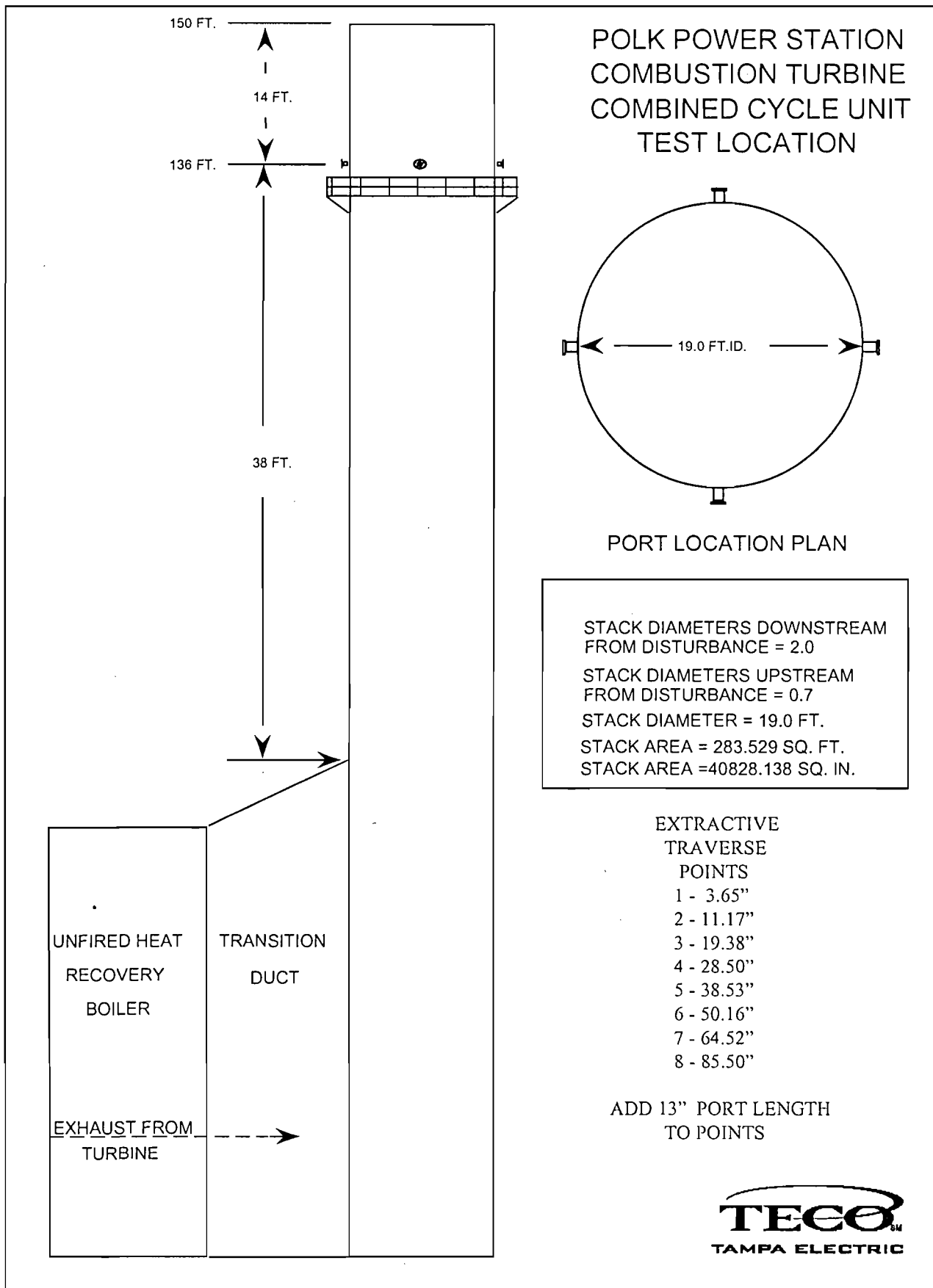
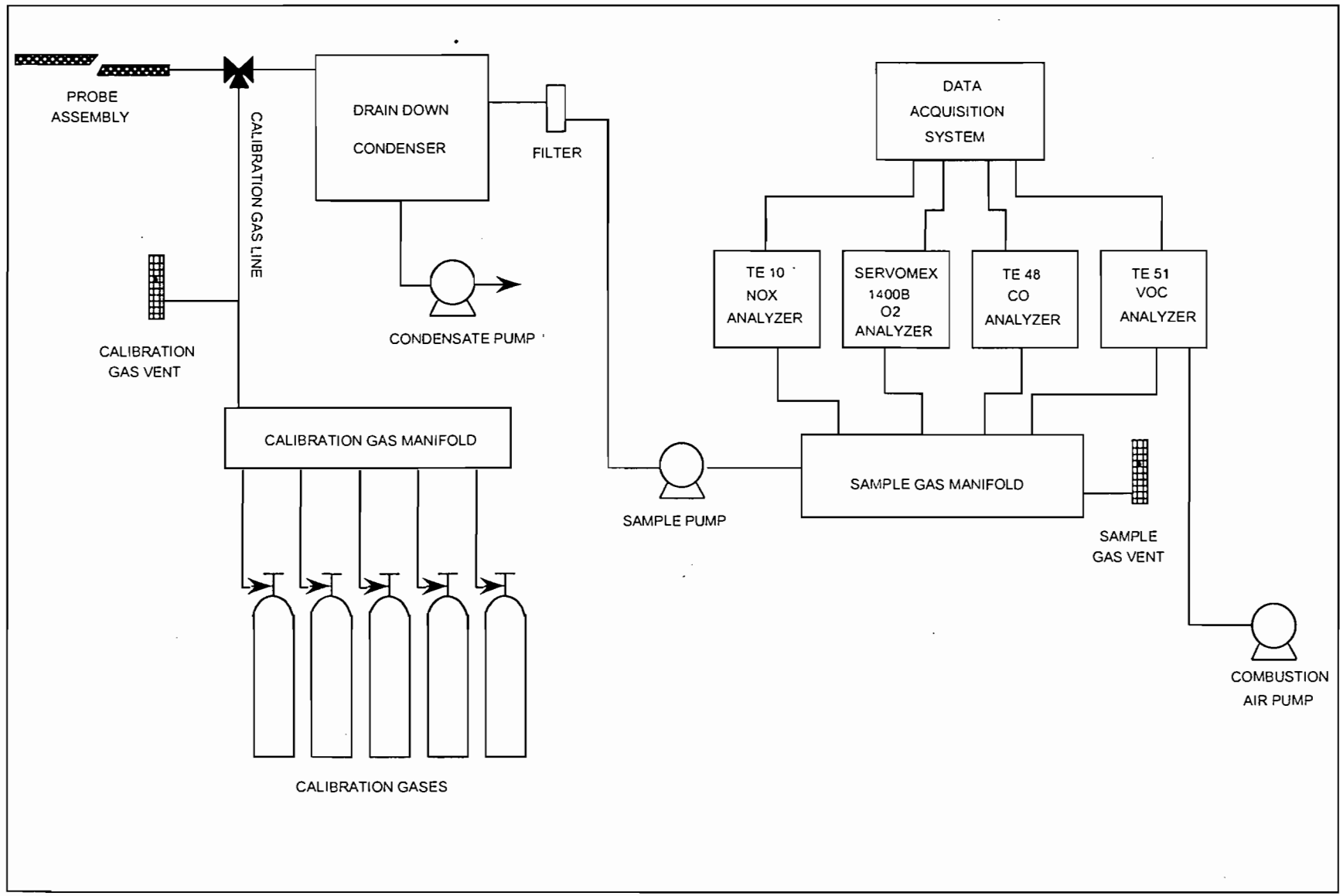


FIGURE 2



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FIGURE 3
Extractive Method Sampling Trains
USEPA METHODS 3A, 10, 20, 25 CEM SYSTEM LAYOUT

3.0 TEST RESULTS

**POLK POWER ELECTRICAL GENERATING STATION
NITROGEN OXIDES BACT TESTING**

IGCC COMBUSTION TURBINE UNIT 1 OCTOBER 14, 1999
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RUN NO.	TIME	O2%	ppm NOx Dry	CORRECTED 15% O2
1	1149 – 1249	11.88	27.0	16.7
2	1301 – 1401	11.85	27.2	16.7
3	1416 – 1516	11.83	28.0	16.7
	Average	11.85	27.4	16.7

Corrected NOx calculated as:

Concentration (ppm NOx) x Cd / (20.9/20.9 - %O₂)

Where:

Cd = NOx coefficient of 5.9

APPENDIX A

SOURCE TEST CALCULATIONS

APPENDIX A - 1 NITROGEN OXIDE CALCULATIONS

APPENDIX A - 2 OXYGEN CALCULATIONS

APPENDIX A - 1

NITROGEN OXIDE CALCULATIONS

CALCULATION OF AVERAGE NITROGEN OXIDES EMISSIONS

RUN: 1
 SOURCE: POLK POWER STATION UNIT 1 BACT STUDY
 TEST DATE: 10/14/99

GAS VALUE	INITIAL CAL	FINAL CAL	MEAN CAL
0.0 ppm NOx	0.7	1.2	1.0
24.0 ppm NOx	25.3	25.4	25.4
0.00 % Oxygen	0.05	0.02	0.04
11.96 % Oxygen	12.14	12.10	12.12

$\bar{C}(\text{NOx}) = 27.0$ $\bar{C}(\text{O2}) = 11.88$

CORRECTED RESULTS

26 ppm NOx
 11.7 % Oxygen
 16.7 ppm NOx @15% O2

Corr. Conc. = $\bar{Cma}(C - Co)/(Cm - Co)$ (for NOx)

Corr. Conc. = $[(Cma - Coa)/(Cm - Co)](C - Cm) + Cma$ (for O2)

Where: \bar{C} = mean reference measurement
 Co = mean zero calibration response
 Coa = actual low-level calibration gas concentration
 Cm = mean mid or upscale calibration gas response
 Cma = actual mid or upscale calibration gas concentration

E = (ppm NOx)(5.9)/(20.9 - % Oxygen)

CALCULATION OF AVERAGE NITROGEN OXIDES EMISSIONS

RUN: 2
 SOURCE: POLK POWER STATION UNIT 1 BACT STUDY
 TEST DATE: 10/14/99

GAS VALUE	INITIAL CAL	FINAL CAL	MEAN CAL
0.0 ppm NOx	1.2	2.0	1.6
24.0 ppm NOx	25.4	25.8	25.6
0.00 % Oxygen	0.02	0.02	0.02
11.96 % Oxygen	12.10	12.09	12.10
$\bar{C}(\text{NOx}) =$	27.2	$\bar{C}(\text{O2}) =$	11.85

CORRECTED RESULTS

26 ppm NOx
 11.7 % Oxygen
 16.7 ppm NOx @ 15% O2

$$\text{Corr. Conc.} = \bar{C}_m(C - C_o)/(C_m - C_o) \quad (\text{for NOx})$$

$$\text{Corr. Conc.} = [(C_m - C_o)/(C_m - C_o)](C - C_m) + C_m \quad (\text{for O2})$$

Where: \bar{C} = mean reference measurement
 C_o = mean zero calibration response
 C_oa = actual low-level calibration gas concentration
 C_m = mean mid or upscale calibration gas response
 C_ma = actual mid or upscale calibration gas concentration

$$E = (\text{ppm NOx})(5.9)/(20.9 - \% \text{ Oxygen})$$

CALCULATION OF AVERAGE NITROGEN OXIDES EMISSIONS

RUN: 3

SOURCE: POLK POWER STATION UNIT 1 BACT STUDY

TEST DATE: 10/14/99

GAS VALUE	INITIAL CAL	FINAL CAL	MEAN CAL
0.0 ppm NOx	2.0	2.9	2.5
24.0 ppm NOx	25.8	26.6	26.2
0.00 % Oxygen	0.02	0.03	0.03
11.96 % Oxygen	12.09	12.08	12.09
$\bar{C}(\text{NOx}) =$	28.0	$\bar{C}(\text{O}_2) =$	11.83

CORRECTED RESULTS

26 ppm NOx
 11.7 % Oxygen
 -16.7 ppm NOx @15% O2

Corr. Conc. = $\bar{C}_{ma}(C - C_o)/(C_m - C_o)$ (for NOx)

Corr. Conc. = $[(C_{ma} - C_{oa})/(C_m - C_o)](C - C_m) + C_{ma}$ (for O2)

Where: \bar{C} = mean reference measurement
 C_o = mean zero calibration response
 C_{oa} = actual low-level calibration gas concentration
 C_m = mean mid or upscale calibration gas response
 C_{ma} = actual mid or upscale calibration gas concentration

E = (ppm NOx)(5.9)/(20.9 - % Oxygen)

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 1.194E-07

APPENDIX A - 2

OXYGEN CALCULATIONS

CALCULATION OF AVERAGE OXYGEN CONCENTRATION

RUN: 1
SOURCE: POLK POWER STATION UNT 1 BACT STUDY
TEST DATE: 10/14/99

GAS VALUE	INITIAL CAL	FINAL CAL	MEAN CAL
0.00 % Oxygen	0.05	0.02	0.04
11.96 % Oxygen	12.14	12.10	12.12

$\bar{C} =$ 11.88

CORRECTED RESULTS

11.7 % Oxygen

Corrected Conc. = $C_m(C - \bar{C}_o)/(C_m - C_o)$

- Where: \bar{C} = mean reference measurement
 C_o = mean zero calibration response
 C_m = mean mid or upscale calibration gas response
 C_{ma} = actual mid or upscale calibration gas concentration

CALCULATION OF AVERAGE OXYGEN CONCENTRATION

RUN: 2

SOURCE: POLK POWER STATION UNT 1 BACT STUDY

TEST DATE: 10/14/99

GAS VALUE	INITIAL CAL	FINAL CAL	MEAN CAL
0.00 % Oxygen	0.02	0.02	0.02
11.96 % Oxygen	12.10	12.09	12.10

$\bar{C} =$ 11.85

CORRECTED RESULTS

11.7 % Oxygen

$$\text{Corrected Conc.} = C_{ma}(C - \bar{C}_o)/(C_m - C_o)$$

Where: \bar{C} = mean reference measurement

C_o = mean zero calibration response

C_m = mean mid or upscale calibration gas response

C_{ma} = actual mid or upscale calibration gas concentration

CALCULATION OF AVERAGE OXYGEN CONCENTRATION

RUN: 3
SOURCE: POLK POWER STATION UNT 1 BACT STUDY
TEST DATE: 10/14/99

GAS VALUE	INITIAL CAL	FINAL CAL	MEAN CAL
0.00 % Oxygen	0.02	0.03	0.03
11.96 % Oxygen	12.09	12.08	12.09

$\bar{C} =$ 11.83

CORRECTED RESULTS

11.7 % Oxygen

$$\text{Corrected Conc.} = C_{ma}(C - \bar{C}_o)/(C_m - C_o)$$

Where: \bar{C} = mean reference measurement
 C_o = mean zero calibration response
 C_m = mean mid or upscale calibration gas response
 C_{ma} = actual mid or upscale calibration gas concentration

APPENDIX B

TURBINE DATA

1 MINUTE AVERAGES

TEST PERIOD 1

10/14/99 9:00

10/14/99 15:30

	Load (MW)			Fuel Flow (lb/sec)		Inlet Temp. (deg F)		Inlet Pressure
	1TSYFI910	1PWRJI900	1GMLJI962	1TSYJYI910	1NITFI920A	1TMSTI922M	1TMSP1909	
14-Oct-99 09:00:00	102.5062103	192.08992	192.2987671	174.954071	118.2088623	75.31647491	29.70635414	
14-Oct-99 09:01:00	102.7073746	191.8222504	192.2927246	174.954071	118.2024612	74.97769165	29.70630455	
14-Oct-99 09:02:00	102.443924	191.9255676	192.2866669	174.954071	118.1960602	74.77236938	29.70625496	
14-Oct-99 09:03:00	102.8199005	192.2231903	192.2806244	174.954071	118.1896667	74.92636108	29.70620537	
14-Oct-99 09:04:00	102.7282715	192.1581573	192.2745667	174.954071	118.1832657	74.76528168	29.70615387	
14-Oct-99 09:05:00	102.3066635	192.0931396	192.2685089	174.954071	118.1768646	74.92054749	29.70610428	
14-Oct-99 09:06:00	102.5166397	192.0281067	192.2624664	174.954071	118.1704636	75.31647491	29.70605469	
14-Oct-99 09:07:00	102.5436401	192.0397797	192.2564087	174.954071	118.1640701	75.31647491	29.7060051	
14-Oct-99 09:08:00	102.1367111	191.6584625	192.250351	174.954071	118.1576691	75.03427887	29.70595551	
14-Oct-99 09:09:00	102.7266006	191.6448364	192.2540131	174.954071	118.151268	75.11159515	29.70590591	
14-Oct-99 09:10:00	102.6680832	191.9403992	192.271286	174.954071	118.1448669	75.18891144	29.70585632	
14-Oct-99 09:11:00	102.5425644	191.7804413	192.2885437	174.954071	118.1384735	75.26622009	29.70580673	
14-Oct-99 09:12:00	102.5449371	191.6204681	192.3058167	174.954071	118.1320724	75.60093689	29.70575523	
14-Oct-99 09:13:00	102.5763702	192.1143188	192.3230743	174.954071	118.1256714	75.54104614	29.70570564	
14-Oct-99 09:14:00	102.5352402	191.883606	192.3403473	174.954071	118.119278	75.48116302	29.70565605	
14-Oct-99 09:15:00	102.334816	191.8204346	192.357605	174.954071	118.1128769	75.42127228	29.70560646	
14-Oct-99 09:16:00	102.5286865	191.3960724	192.3748779	174.954071	118.1064758	75.36138916	29.70555687	
14-Oct-99 09:17:00	102.5153656	191.9415741	192.3921356	174.954071	118.1000748	75.1450882	29.70550728	
14-Oct-99 09:18:00	102.654953	191.8485107	192.4094086	174.954071	118.0936813	75.64302063	29.70545769	
14-Oct-99 09:19:00	102.7574997	191.7554626	192.4266663	174.954071	118.0872803	75.74512482	29.7054081	
14-Oct-99 09:20:00	102.3645248	191.8808289	192.4439392	174.954071	118.0808792	75.847229	29.7053566	
14-Oct-99 09:21:00	102.3625717	191.7828827	192.4611969	174.954071	118.0744781	75.88705444	29.70530701	
14-Oct-99 09:22:00	102.379837	191.8640289	192.4784698	174.954071	118.0680847	75.89227295	29.70525742	
14-Oct-99 09:23:00	102.379837	191.927063	192.2904205	174.954071	118.0616837	75.91634369	29.70520782	
14-Oct-99 09:24:00	102.0410767	192.0444336	192.0294037	174.954071	118.0552826	75.76483154	29.70515823	
14-Oct-99 09:25:00	102.3615265	191.8240814	192.0900726	174.954071	118.0488815	75.63110352	29.70510864	
14-Oct-99 09:26:00	102.6009216	191.6116791	192.1507568	174.954071	118.0424881	75.83531952	29.70505905	
14-Oct-99 09:27:00	102.7295761	191.6063232	192.2114258	174.954071	118.036087	76.03952789	29.70500946	
14-Oct-99 09:28:00	102.299263	191.3451538	192.2971802	174.954071	118.029686	76.24373627	29.70495796	
14-Oct-99 09:29:00	102.8196793	191.698349	192.418045	174.954071	118.0232925	76.09571075	29.70490837	
14-Oct-99 09:30:00	102.5470047	191.4645386	192.2871246	174.954071	118.0168915	75.94171906	29.70485878	
14-Oct-99 09:31:00	102.7748947	191.7687073	192.080658	174.954071	118.0104904	76.22188568	29.70480919	
14-Oct-99 09:32:00	102.4687653	191.6801758	192.2619476	174.954071	118.0040894	75.95524597	29.7047596	

Sheet1

14-Oct-99 09:33:00	102.3683167	191.9094696	192.216629	174.954071	117.9976959	76.41597748	29.70471001
14-Oct-99 09:34:00	102.4161453	191.5153809	192.105011	174.954071	117.9912949	76.60016632	29.70466042
14-Oct-99 09:35:00	102.7094345	191.8649597	192.3447113	174.954071	117.9848938	76.78435516	29.70461082
14-Oct-99 09:36:00	102.620903	191.8187408	192.4594421	174.954071	117.9784927	76.96854401	29.70455933
14-Oct-99 09:37:00	102.5189972	192.0215454	192.3866882	174.954071	117.9720993	77.15273285	29.70450974
14-Oct-99 09:38:00	102.130806	191.6722565	192.3139343	174.954071	117.9656982	76.93497467	29.70446014
14-Oct-99 09:39:00	102.1917114	192.2325745	192.2411652	174.954071	117.9592972	76.92214203	29.70441055
14-Oct-99 09:40:00	102.5934601	191.7436523	192.1684113	174.954071	117.9528961	77.38412476	29.70436096
14-Oct-99 09:41:00	102.7218399	191.8202057	192.2770386	174.954071	117.9465027	76.80664825	29.70431137
14-Oct-99 09:42:00	102.5271454	191.8769379	192.2871246	174.954071	117.9401016	77.00468445	29.70426178
14-Oct-99 09:43:00	102.7277451	191.7553711	192.0722656	174.954071	117.9337006	76.97090912	29.70421219
14-Oct-99 09:44:00	102.8862152	191.6623077	192.2333984	174.954071	117.9272995	77.08734131	29.70416069
14-Oct-99 09:45:00	102.4501495	191.9298401	192.3945465	174.954071	117.9209061	76.92449951	29.70411111
14-Oct-99 09:46:00	102.4695587	191.7975464	192.317337	174.954071	117.914505	77.00118256	29.70406151
14-Oct-99 09:47:00	102.6255341	191.7975464	192.1202545	174.954071	117.9081039	77.0778656	29.70401192
14-Oct-99 09:48:00	102.3155899	191.7975464	192.2225647	174.954071	117.9017105	77.15454865	29.70396233
14-Oct-99 09:49:00	102.3399811	191.8876038	192.3248596	174.954071	117.8953094	77.55180359	29.70391273
14-Oct-99 09:50:00	102.1881332	191.4197693	192.4271545	174.954071	117.8889084	77.67414093	29.70386314
14-Oct-99 09:51:00	102.7343292	191.9116058	192.4641724	174.954071	117.8825073	77.64334106	29.70381165
14-Oct-99 09:52:00	102.4147034	191.5531006	192.4032288	174.954071	117.8761139	77.75997925	29.70376205
14-Oct-99 09:53:00	102.6504593	191.1734772	192.468399	174.954071	117.8697128	77.65788269	29.70371246
14-Oct-99 09:54:00	102.1574478	191.1530457	192.5237885	174.954071	117.8633118	77.5557785	29.70366287
14-Oct-99 09:55:00	102.2048264	191.8512726	192.3183289	174.954071	117.8569107	77.77680969	29.70361328
14-Oct-99 09:56:00	102.7403336	191.917923	192.2286987	174.954071	117.8505173	78.08137512	29.70356369
14-Oct-99 09:57:00	102.1580048	191.4791718	192.3012085	174.954071	117.8441162	77.97871399	29.7035141
14-Oct-99 09:58:00	102.7706757	191.2755127	192.3737335	174.954071	117.8377151	77.87604523	29.70346451
14-Oct-99 09:59:00	102.5675201	191.8363037	192.4462433	174.954071	117.8313141	77.92889404	29.70341301
14-Oct-99 10:00:00	102.3566513	191.875885	192.4381866	174.954071	117.8249207	77.90667725	29.70336342
14-Oct-99 10:01:00	102.6293259	191.6980286	192.3173218	174.954071	117.8185196	77.91539764	29.70331383
14-Oct-99 10:02:00	102.4147339	191.9314117	192.2412262	174.954071	117.8121185	78.22338867	29.70326424
14-Oct-99 10:03:00	102.5028229	191.5396881	192.2277985	174.954071	117.8057251	77.88146973	29.70321465
14-Oct-99 10:04:00	102.5946121	191.5097504	192.2143707	174.954071	117.799324	78.11058044	29.70316505
14-Oct-99 10:05:00	102.6113205	191.8433228	192.200943	174.954071	117.792923	78.33969879	29.70311546
14-Oct-99 10:06:00	102.2434616	191.8433228	192.1875153	174.954071	117.7865219	78.56880951	29.70306587
14-Oct-99 10:07:00	102.5751266	191.8433228	192.1740875	174.954071	117.7801285	78.62890625	29.70301437
14-Oct-99 10:08:00	102.6764755	191.8433228	192.1606598	174.954071	117.7737274	78.13708496	29.70296478
14-Oct-99 10:09:00	102.5612946	191.9188995	192.1472321	174.954071	117.7673264	78.19828033	29.70291519
14-Oct-99 10:10:00	102.3338547	192.2480011	192.1338043	174.954071	117.7609253	78.25947571	29.7028656
14-Oct-99 10:11:00	102.5590515	191.9914246	192.2971802	174.954071	117.7545319	78.32067108	29.70281601
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14-Oct-99 10:14:00	102.2719727	191.575058	192.4466095	174.954071	117.8342361	78.13613129	29.70266724
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14-Oct-99 10:21:00	102.543808	191.830719	192.1851196	174.954071	118.1475449	78.55321503	29.70231819
14-Oct-99 10:22:00	103.0348969	192.2826233	192.1477661	174.954071	118.1922989	78.67560577	29.7022686
14-Oct-99 10:23:00	102.5703049	192.466568	192.1763306	174.954071	118.2370605	78.79799652	29.7022171
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14-Oct-99 10:30:00	102.5914612	191.6430817	192.2038879	174.954071	118.5503693	78.55400085	29.70186996
14-Oct-99 10:31:00	102.7264175	191.8006897	192.383667	174.954071	118.5951309	78.70736694	29.70181847
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14-Oct-99 10:37:00	102.8637695	191.9074097	192.4417877	174.954071	118.863678	79.15872955	29.70152092
14-Oct-99 10:38:00	102.5389099	192.1567383	192.4331512	174.954071	118.908432	79.31314087	29.70147133
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14-Oct-99 10:40:00	102.3285904	191.9224243	192.4158936	174.954071	118.9887466	79.62197113	29.70137024
14-Oct-99 10:41:00	102.9399261	191.4244537	192.4072571	174.954071	118.9832993	79.37834167	29.70132065
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14-Oct-99 10:43:00	102.3615265	191.5718994	192.3899841	174.954071	118.9724045	79.45922852	29.70122147
14-Oct-99 10:44:00	102.6883774	191.827652	192.3813629	174.954071	118.9669571	79.73778534	29.70117188
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14-Oct-99 10:47:00	102.3745193	191.1925049	192.367691	174.954071	118.9506149	79.97597504	29.70102119
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14-Oct-99 10:54:00	102.3582153	192.1331482	192.367691	174.954071	118.9124832	79.69145966	29.70067406

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14-Oct-99 10:55:00	102.5720978	191.4649811	192.392868	174.954071	118.9070358	79.54772949	29.70062256
14-Oct-99 10:56:00	102.4733505	191.5844116	192.4532928	174.954071	118.9015884	79.06521606	29.70057297
14-Oct-99 10:57:00	102.2653885	191.9311218	192.5137177	174.954071	118.8961411	79.48970032	29.70052338
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14-Oct-99 11:13:00	102.4370575	191.7810364	192.5227814	174.954071	118.8089905	80.01630402	29.6997261
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14-Oct-99 11:27:00	102.8845673	191.6421967	192.3243866	174.954071	118.7327271	81.23529053	29.69902802
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14-Oct-99 11:52:00	102.9642639	191.6569977	192.3012085	174.954071	118.3860397	81.32022095	29.69778252
14-Oct-99 11:53:00	102.9585114	192.004364	192.3737335	174.954071	118.3692322	81.84379578	29.69773293
14-Oct-99 11:54:00	102.6681595	191.4532318	192.4203491	174.954071	118.3524323	81.58714294	29.69768333
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14-Oct-99 12:03:00	102.7750015	191.4857941	192.2612305	174.954071	118.2011795	81.71420288	29.69723511
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14-Oct-99 12:17:00	102.5666656	191.8292084	192.6848602	174.954071	117.9659042	82.31755066	29.69653702
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14-Oct-99 12:23:00	102.766655	191.8969116	192.2677765	174.954071	117.8650742	82.07141876	29.69623756
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14-Oct-99 12:29:00	102.9843979	191.6040955	192.4143066	174.954071	117.7642365	81.93315125	29.69594002
14-Oct-99 12:30:00	102.6819687	191.4777069	192.3625031	174.954071	117.7474365	82.08589172	29.69588852
14-Oct-99 12:31:00	102.810524	191.8378296	192.3107147	174.954071	117.730629	82.08506012	29.69583893
14-Oct-99 12:32:00	103.0329285	191.8677368	192.2589111	174.954071	117.7138214	81.97375488	29.69578934
14-Oct-99 12:33:00	102.9200134	191.9107056	192.2071228	174.954071	117.6970215	81.73891449	29.69573975
14-Oct-99 12:34:00	102.6682358	191.2372437	192.1553345	174.954071	117.6802139	82.10186768	29.69569016
14-Oct-99 12:35:00	103.0069122	191.7674255	192.3835297	174.954071	117.6634064	81.90040588	29.69564056
14-Oct-99 12:36:00	102.9540024	192.1934967	192.7014008	174.954071	117.6465988	82.00363159	29.69559097
14-Oct-99 12:37:00	102.8472214	191.9619598	192.6321716	174.954071	117.6297989	82.1068573	29.69554138
14-Oct-99 12:38:00	102.4973297	191.6783752	192.5629425	174.954071	117.6129913	81.93199921	29.69548988
14-Oct-99 12:39:00	103.0171967	191.5102692	192.4937286	174.954071	117.5961838	81.92592621	29.69544029
14-Oct-99 12:40:00	102.7899704	191.5038147	192.4244995	174.954071	117.5793762	82.16481018	29.6953907
14-Oct-99 12:41:00	102.6570435	192.1140289	192.3552704	174.954071	117.5625763	82.01206207	29.69534111
14-Oct-99 12:42:00	103.0703278	191.8080444	192.2860565	174.954071	117.5457687	81.93721771	29.69529152
14-Oct-99 12:43:00	102.9652023	191.702774	192.2625427	174.954071	117.5289612	82.1747818	29.69524193
14-Oct-99 12:44:00	103.0201111	191.5404205	192.2987976	174.954071	117.5121613	82.01951599	29.69519234
14-Oct-99 12:45:00	102.9573822	191.4646912	192.3350525	174.954071	117.4953537	82.19282532	29.69514275
14-Oct-99 12:46:00	102.9312744	191.356842	192.3713074	174.954071	117.4785461	82.2949295	29.69509125
14-Oct-99 12:47:00	102.8925476	191.9544067	192.4075623	174.954071	117.4617386	82.39703369	29.69504166
14-Oct-99 12:48:00	102.8907166	192.1973419	192.4438171	174.954071	117.4449387	82.49913788	29.69499207
14-Oct-99 12:49:00	103.1638565	191.850769	192.480072	174.954071	117.4281311	82.4004364	29.69494247
14-Oct-99 12:50:00	102.8267288	191.8730927	192.5163422	174.954071	117.4113235	82.29833221	29.69489288
14-Oct-99 12:51:00	102.9560471	191.8457184	192.3064575	174.954071	117.394516	82.19622803	29.69484329
14-Oct-99 12:52:00	102.8770905	191.7998657	192.0572815	174.954071	117.3777161	82.28131866	29.6947937
14-Oct-99 12:53:00	102.6972275	192.1716919	192.1776276	174.954071	117.3609085	82.38342285	29.69474411
14-Oct-99 12:54:00	102.920929	192.1450043	192.2979889	174.954071	117.344101	82.48552704	29.69469261
14-Oct-99 12:55:00	102.7999573	191.201828	192.418335	174.954071	117.327301	82.23468781	29.69464302
14-Oct-99 12:56:00	102.8306274	191.5650177	192.4633636	174.954071	117.3104935	82.13553619	29.69459343
14-Oct-99 12:57:00	102.8020401	191.5552979	192.4029388	174.954071	117.2936859	81.91640472	29.69454384

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14-Oct-99 12:58:00	103.2144623	191.3028564	192.3604736	174.954071	117.2768784	81.96759796	29.69449425
14-Oct-99 12:59:00	102.9148254	191.5752869	192.3431702	174.954071	117.2600784	82.01878357	29.69444466
14-Oct-99 13:00:00	102.614006	191.8310699	192.3258667	174.954071	117.2432709	82.06997681	29.69439507
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14-Oct-99 13:04:00	102.7153397	191.7673645	192.2566376	174.954071	117.1760483	82.04741669	29.69419479
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14-Oct-99 13:10:00	102.8258667	191.240387	192.4675903	174.954071	117.0752182	82.04399109	29.69389534
14-Oct-99 13:11:00	102.9032288	191.9318695	192.4192505	174.954071	117.0584106	82.50083923	29.69384575
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14-Oct-99 13:13:00	102.7154388	192.2310028	192.3225708	174.954071	117.0248032	82.26154327	29.69374657
14-Oct-99 13:14:00	102.8510437	191.8533783	192.2742157	174.954071	117.0079956	82.41428375	29.69369698
14-Oct-99 13:15:00	103.0190201	192.0030975	192.2815552	174.954071	117.0171814	82.36515808	29.69364738
14-Oct-99 13:16:00	103.0440598	192.014328	192.3616791	174.954071	117.0322037	82.56448364	29.69359779
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14-Oct-99 13:22:00	102.6869965	192.0483398	192.1704865	174.954071	117.1223221	82.949646	29.69329834
14-Oct-99 13:23:00	103.0129395	191.9552917	192.2732239	174.954071	117.1373444	82.58810425	29.69324875
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14-Oct-99 13:25:00	102.8986206	191.7718506	192.4786682	174.954071	117.1673889	82.99945068	29.69314766
14-Oct-99 13:26:00	102.6897278	192.0597992	192.4775238	174.954071	117.1824112	82.8973465	29.69309807
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14-Oct-99 13:28:00	102.8837204	191.5092163	192.203598	174.954071	117.2124481	82.78829193	29.69299889
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14-Oct-99 13:35:00	102.6038361	191.4170532	192.1587524	174.954071	117.3175964	82.19116211	29.69264984
14-Oct-99 13:36:00	102.7935104	192.0084076	192.21315	174.954071	117.3326111	82.29438782	29.69260025
14-Oct-99 13:37:00	102.650528	191.7700653	192.105835	174.954071	117.3476334	82.39761353	29.69255066
14-Oct-99 13:38:00	102.8910141	191.492157	192.3475494	174.954071	117.3626556	82.50083923	29.69250107

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14-Oct-99 13:39:00	102.8049545	191.5759735	192.4801483	174.954071	117.3776779	82.18772125	29.69245148
14-Oct-99 13:40:00	102.6697311	192.0995178	192.4600067	174.954071	117.3927002	82.50083923	29.69240189
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14-Oct-99 13:42:00	102.930069	191.7026215	192.4197235	174.954071	117.4227371	82.59152222	29.6923008
14-Oct-99 13:43:00	102.9990311	191.5823059	192.3995819	174.954071	117.4377594	82.79684448	29.69225121
14-Oct-99 13:44:00	102.679039	192.0476379	192.3794403	174.954071	117.4527817	82.53619385	29.69220161
14-Oct-99 13:45:00	102.8477402	191.8290405	192.3592834	174.954071	117.4677963	82.77289581	29.69215202
14-Oct-99 13:46:00	102.8038406	192.2919464	192.3391418	174.954071	117.4828186	82.72498322	29.69210243
14-Oct-99 13:47:00	102.6934662	191.7426147	192.3190002	174.954071	117.4978409	82.62232208	29.69205284
14-Oct-99 13:48:00	102.6211472	192.2419586	192.2988586	174.954071	117.5128632	82.51966095	29.69200325
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14-Oct-99 13:50:00	102.7369003	191.5066528	192.2585754	174.954071	117.5429001	82.77832031	29.69190216
14-Oct-99 13:51:00	102.8175278	191.9711304	192.2805786	174.954071	117.5579224	82.57783508	29.69185257
14-Oct-99 13:52:00	103.1705475	192.1278839	192.3616028	174.954071	117.5729446	82.73567963	29.69180298
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14-Oct-99 13:54:00	102.8469925	191.9506378	192.3314362	174.954071	117.6029892	83.25540924	29.6917038
14-Oct-99 13:55:00	102.7019348	191.7371216	192.1779175	174.954071	117.6180038	83.00901794	29.69165421
14-Oct-99 13:56:00	102.6911926	191.5173798	192.2977753	174.954071	117.6330261	83.05863953	29.69160461
14-Oct-99 13:57:00	102.6510468	192.0264282	192.3339386	174.954071	117.6480484	82.95597839	29.69155312
14-Oct-99 13:58:00	102.5952911	191.7953033	192.2529144	174.954071	117.6630707	82.85330963	29.69150352
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14-Oct-99 14:20:00	102.4576569	191.9857941	192.2468262	174.954071	117.9935226	82.25787354	29.69124413
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14-Oct-99 14:53:00	102.8658447	191.6574554	192.3739929	174.954071	118.1191101	83.12194824	29.69124413
14-Oct-99 14:54:00	102.857872	191.9797363	192.3890991	174.954071	118.1202545	83.44020081	29.69124413
14-Oct-99 14:55:00	102.9017029	192.2845917	192.4042053	174.954071	118.1213989	83.16423035	29.69124413
14-Oct-99 14:56:00	102.3432083	191.9291687	192.4193115	174.954071	118.1225357	82.99139404	29.69124413
14-Oct-99 14:57:00	102.6701965	192.0462341	192.4344177	174.954071	118.1236801	83.12708282	29.69124413
14-Oct-99 14:58:00	102.6442184	191.8733368	192.4495239	174.954071	118.1248245	83.12708282	29.69124413
14-Oct-99 14:59:00	102.7874832	191.9366455	192.4646301	174.954071	118.1259689	82.87088776	29.69124413
14-Oct-99 15:00:00	102.6239777	191.4553223	192.4797363	174.954071	118.1271057	83.02616119	29.69124413

Sheet1

14-Oct-99 15:01:00	102.6891327	191.5775146	192.4532928	174.954071	118.1282501	83.01928711	29.69124413
14-Oct-99 15:02:00	102.5864868	191.877533	192.3686981	174.954071	118.1293945	82.91496277	29.69124413
14-Oct-99 15:03:00	102.5640869	192.1209717	192.3334503	174.954071	118.1305313	83.03468323	29.69124413
14-Oct-99 15:04:00	102.6989059	192.0343933	192.3672943	174.954071	118.1316757	82.98848724	29.69124413
14-Oct-99 15:05:00	102.7336807	191.9478149	192.401123	174.954071	118.1328201	83.20989227	29.69124413
14-Oct-99 15:06:00	102.665184	192.1955872	192.434967	174.954071	118.1339569	83.52042389	29.69124413
14-Oct-99 15:07:00	102.9436035	192.112442	192.4687958	174.954071	118.1351013	83.92271423	29.69124413
14-Oct-99 15:08:00	102.9845352	191.7139435	192.471756	174.954071	118.1362457	83.44020081	29.69124413
14-Oct-99 15:09:00	103.0101013	191.5833588	192.4314728	174.954071	118.1373901	83.32909393	29.69124413
14-Oct-99 15:10:00	102.9529724	191.955658	192.3911896	174.954071	118.1385269	82.83705902	29.69124413
14-Oct-99 15:11:00	102.9566345	191.7170105	192.3620911	174.954071	118.1396713	82.99105072	29.69124413
14-Oct-99 15:12:00	102.6379089	191.7078094	192.3486633	174.954071	118.1408157	83.09055328	29.69124413
14-Oct-99 15:13:00	102.8352814	191.650589	192.3352356	174.954071	118.1419525	83.44020081	29.69124413
14-Oct-99 15:14:00	103.1241837	191.6732941	192.3218079	174.954071	118.1430969	83.44020081	29.69124413
14-Oct-99 15:15:00	102.8191452	192.1272888	192.3083801	174.954071	118.1442413	83.44020081	29.69124413
14-Oct-99 15:16:00	102.8457108	191.7549591	192.2949524	174.954071	118.1453857	83.7481842	29.69124413
14-Oct-99 15:17:00	102.7456055	191.7475739	192.2815247	174.954071	118.1465225	83.64552307	29.69124413
14-Oct-99 15:18:00	102.8520279	192.0500183	192.2680969	174.954071	118.1476669	83.54286194	29.69124413
14-Oct-99 15:19:00	102.888855	191.7559662	192.2546539	174.954071	118.1488113	83.44020081	29.69124413
14-Oct-99 15:20:00	102.6673508	191.7535706	192.1461182	174.954071	118.1499481	83.72200775	29.69124413
14-Oct-99 15:21:00	103.13517	191.5789948	192.2266846	174.954071	118.1510925	83.15274811	29.69124413
14-Oct-99 15:22:00	103.1314774	191.7796936	192.5127106	174.954071	118.1522369	83.26940918	29.69124413
14-Oct-99 15:23:00	103.2250443	191.6397247	192.4546967	174.954071	118.1533813	83.42467499	29.69124413
14-Oct-99 15:24:00	102.9429016	191.9774323	192.3966827	174.954071	118.1545181	83.21057892	29.69124413
14-Oct-99 15:25:00	103.187355	191.5106659	192.3386841	174.954071	118.1556625	83.70635223	29.69124413
14-Oct-99 15:26:00	102.7343521	191.5987701	192.2806702	174.954071	118.1568069	83.18768311	29.69124413
14-Oct-99 15:27:00	103.2304001	191.4481049	192.2971802	174.954071	118.1579437	83.61985779	29.69124413
14-Oct-99 15:28:00	103.0399628	191.6803436	192.4180298	174.954071	118.1590881	83.63169098	29.69124413
14-Oct-99 15:29:00	102.8704147	191.9083252	192.5388947	174.954071	118.1602325	83.4764328	29.69124413
14-Oct-99 15:30:00	102.7596359	191.6734924	192.3576202	174.954071	118.1613693	83.75331879	29.69124413

Run 1

Record#	DATE	TIME	PC1CO211	PC1GEN12	PC1NOX13	PC1NOX14	PC1PRS15	PC1TMP16	PC1SYN17
1	10/14/1999	115000	8.123	190.991	0.097	28.595	29.715	299.685	66.714
2	10/14/1999	115100	8.101	190.882	0.097	28.498	29.714	299.471	66.714
3	10/14/1999	115200	8.099	191.046	0.097	28.510	29.715	297.470	66.714
4	10/14/1999	115300	8.080	191.635	0.098	28.590	29.716	297.481	66.714
5	10/14/1999	115400	8.102	191.564	0.097	28.482	29.718	296.805	66.714
6	10/14/1999	115500	8.110	191.311	0.097	28.557	29.716	296.678	66.714
7	10/14/1999	115600	8.123	191.301	0.097	28.689	29.711	296.582	66.714
8	10/14/1999	115700	8.128	191.289	0.097	28.710	29.713	296.493	66.714
9	10/14/1999	115800	8.107	191.378	0.097	28.446	29.713	297.325	66.714
10	10/14/1999	115900	8.111	191.573	0.097	28.592	29.712	298.617	66.714
11	10/14/1999	120000	8.107	191.337	0.097	28.623	29.710	298.607	66.714
12	10/14/1999	120100	8.085	190.602	0.096	28.210	29.921	298.830	66.714
13	10/14/1999	120200	5.957	191.072	0.106	22.894	29.710	298.920	66.714
14	10/14/1999	120300	4.537	190.993	0.091	14.943	29.711	300.875	66.714
15	10/14/1999	120400	6.893	190.706	0.096	24.047	29.708	300.770	66.714
16	10/14/1999	120500	7.451	190.967	0.095	25.686	29.710	296.026	66.714
17	10/14/1999	120600	7.590	191.313	0.096	26.378	29.707	295.964	66.714
18	10/14/1999	120700	7.661	191.258	0.097	26.904	29.707	297.485	66.714
19	10/14/1999	120800	7.698	190.930	0.096	26.835	29.711	297.991	66.714
20	10/14/1999	120900	7.769	191.299	0.095	26.883	29.708	299.809	66.714
21	10/14/1999	121000	7.813	191.312	0.096	27.252	29.709	301.359	66.714
22	10/14/1999	121100	7.858	191.496	0.097	27.562	29.707	300.618	66.714
23	10/14/1999	121200	7.872	191.092	0.097	27.806	29.708	299.580	66.714
24	10/14/1999	121300	7.913	191.527	0.098	27.994	29.706	299.396	66.714
25	10/14/1999	121400	7.943	191.527	0.097	27.957	29.705	297.794	66.714
26	10/14/1999	121500	7.948	190.874	0.097	28.062	29.708	297.828	66.714
27	10/14/1999	121600	7.971	190.653	0.096	27.862	29.708	299.028	66.714
28	10/14/1999	121700	7.987	191.478	0.096	27.746	29.708	299.078	66.714
29	10/14/1999	121800	7.993	191.113	0.096	27.956	29.705	299.556	66.714
30	10/14/1999	121900	7.980	191.505	0.096	27.775	29.707	299.977	66.714
31	10/14/1999	122000	7.972	191.144	0.096	27.716	29.710	300.060	66.714
32	10/14/1999	122100	8.020	191.476	0.097	28.104	29.705	300.052	66.714
33	10/14/1999	122200	8.017	191.326	0.097	28.248	29.703	300.437	66.714
34	10/14/1999	122300	8.030	190.969	0.096	28.059	29.702	302.222	66.714
35	10/14/1999	122400	8.011	191.211	0.097	28.106	29.699	302.135	66.714
36	10/14/1999	122500	8.012	190.618	0.097	28.081	29.705	296.266	66.714
37	10/14/1999	122600	8.013	190.916	0.097	28.217	29.701	295.996	66.714
38	10/14/1999	122700	8.023	191.390	0.097	28.257	29.699	298.818	66.714
39	10/14/1999	122800	8.053	191.361	0.097	28.261	29.701	298.780	66.714
40	10/14/1999	122900	8.053	191.173	0.097	28.360	29.700	298.929	66.714
41	10/14/1999	123000	8.052	191.241	0.097	28.335	29.702	298.928	66.714
42	10/14/1999	123100	8.055	191.184	0.098	28.498	29.699	302.116	66.714
43	10/14/1999	123200	8.047	191.519	0.097	28.304	29.702	303.370	66.714
44	10/14/1999	123300	8.041	190.947	0.097	28.226	29.698	300.929	66.714
45	10/14/1999	123400	7.988	190.938	0.096	27.828	29.695	300.122	66.714
46	10/14/1999	123500	7.974	191.285	0.097	28.038	29.698	301.101	66.714
47	10/14/1999	123600	7.995	191.170	0.096	27.914	29.694	301.473	66.714
48	10/14/1999	123700	8.052	191.082	0.096	28.046	29.693	299.789	66.714
49	10/14/1999	123800	8.035	190.962	0.096	28.039	29.696	298.813	66.714
50	10/14/1999	123900	8.072	190.976	0.096	28.101	29.694	299.845	66.714
51	10/14/1999	124000	8.076	190.768	0.096	28.202	29.695	300.426	66.714
52	10/14/1999	124100	8.095	190.855	0.095	27.954	29.694	298.948	66.714
53	10/14/1999	124200	8.105	191.411	0.096	28.259	29.694	297.700	66.714
54	10/14/1999	124300	8.112	191.250	0.097	28.433	29.696	297.598	66.714
55	10/14/1999	124400	8.103	190.793	0.096	28.242	29.694	297.340	66.714
56	10/14/1999	124500	8.119	190.917	0.096	28.261	29.691	297.810	66.714
57	10/14/1999	124600	8.089	191.315	0.096	28.105	29.694	298.206	66.714
58	10/14/1999	124700	8.089	191.145	0.096	28.037	29.698	298.191	66.714

59	10/14/1999	124800	8.087	190.874	0.096	28.057	29.695	298.190	66.714
60	10/14/1999	124900	8.105	191.012	0.096	28.324	29.692	298.167	66.714
61	/ /								
62	/ /	AVB	7.893	191.154	0.097	27.661	29.708	298.981	66.714

Record#	DATE	TIME	PC1CO211	PC1GEN12	PC1NOX13	PC1NOX14	PC1PRS15	PC1TMP16	PC1SYN17
1	10/14/1999	130200	8.072	191.925	0.096	28.085	29.682	300.839	66.714
2	10/14/1999	130300	8.089	191.289	0.096	28.060	29.680	302.425	66.714
3	10/14/1999	130400	8.076	191.067	0.096	28.051	29.684	301.480	66.714
4	10/14/1999	130500	8.084	190.882	0.096	28.038	29.683	296.976	66.714
5	10/14/1999	130600	8.054	191.299	0.095	27.863	29.683	296.995	66.714
6	10/14/1999	130700	8.055	190.913	0.096	27.913	29.684	301.744	66.714
7	10/14/1999	130800	8.076	190.898	0.095	27.882	29.682	301.746	66.714
8	10/14/1999	130900	8.070	191.080	0.095	27.717	29.681	299.119	66.714
9	10/14/1999	131000	8.071	191.292	0.095	27.937	29.680	297.980	66.714
10	10/14/1999	131100	8.072	191.509	0.094	27.556	29.683	300.505	66.714
11	10/14/1999	131200	8.057	191.334	0.095	27.646	29.683	301.159	66.714
12	10/14/1999	131300	8.073	191.316	0.094	27.373	29.686	300.294	66.714
13	10/14/1999	131400	8.115	191.307	0.094	27.544	29.684	299.395	66.714
14	10/14/1999	131500	8.131	191.295	0.094	27.854	29.682	298.145	66.714
15	10/14/1999	131600	8.138	191.457	0.094	27.638	29.677	295.461	66.714
16	10/14/1999	131700	8.161	191.370	0.094	27.855	29.680	295.778	66.714
17	10/14/1999	131800	8.162	191.295	0.094	27.874	29.682	300.498	66.714
18	10/14/1999	131900	8.164	190.852	0.094	27.877	29.681	300.509	66.714
19	10/14/1999	132000	8.161	191.383	0.094	27.948	29.679	297.416	66.714
20	10/14/1999	132100	8.150	191.327	0.095	28.096	29.679	297.366	66.714
21	10/14/1999	132200	8.167	191.245	0.094	27.930	29.678	297.347	66.714
22	10/14/1999	132300	8.166	191.318	0.094	27.841	29.674	297.340	66.714
23	10/14/1999	132400	8.120	191.564	0.095	27.935	29.676	300.309	66.714
24	10/14/1999	132500	8.103	191.626	0.095	27.991	29.676	302.386	66.714
25	10/14/1999	132600	8.061	191.416	0.095	27.769	29.676	301.527	66.714
26	10/14/1999	132700	8.038	191.086	0.095	27.794	29.675	300.614	66.714
27	10/14/1999	132800	8.024	190.890	0.095	27.681	29.675	299.666	66.714
28	10/14/1999	132900	8.035	191.281	0.094	27.373	29.675	296.709	66.714
29	10/14/1999	133000	8.044	191.548	0.094	27.335	29.677	297.341	66.714
30	10/14/1999	133100	8.070	191.110	0.095	27.715	29.679	301.877	66.714
31	10/14/1999	133200	8.074	190.768	0.094	27.443	29.676	301.867	66.714
32	10/14/1999	133300	8.087	190.822	0.094	27.672	29.678	299.952	66.714
33	10/14/1999	133400	8.091	190.942	0.095	27.863	29.676	299.393	66.714
34	10/14/1999	133500	8.105	190.963	0.094	27.603	29.679	298.553	66.714
35	10/14/1999	133600	8.128	191.319	0.094	27.673	29.678	298.207	66.714
36	10/14/1999	133700	8.132	190.818	0.095	27.881	29.678	300.404	66.714
37	10/14/1999	133800	8.122	190.841	0.094	27.679	29.676	302.062	66.714
38	10/14/1999	133900	8.119	191.322	0.094	27.722	29.670	301.157	66.714
39	10/14/1999	134000	8.082	191.294	0.095	27.820	29.669	299.665	66.714
40	10/14/1999	134100	8.090	191.353	0.096	28.084	29.672	299.996	66.714
41	10/14/1999	134200	8.126	191.466	0.094	27.837	29.671	300.737	66.714
42	10/14/1999	134300	8.113	191.285	0.094	27.771	29.668	300.753	66.714
43	10/14/1999	134400	8.138	191.264	0.094	27.734	29.668	303.307	66.714
44	10/14/1999	134500	8.114	191.079	0.095	27.944	29.669	301.254	66.714
45	10/14/1999	134600	8.096	191.125	0.095	27.936	29.669	295.618	66.714
46	10/14/1999	134700	8.098	191.280	0.095	27.806	29.670	296.497	66.714
47	10/14/1999	134800	8.082	191.063	0.095	27.900	29.670	298.451	66.714
48	10/14/1999	134900	8.095	190.674	0.096	28.195	29.670	299.042	66.714
49	10/14/1999	135000	8.102	191.102	0.096	28.145	29.668	302.598	66.714
50	10/14/1999	135100	8.091	191.740	0.096	28.046	29.666	301.934	66.714
51	10/14/1999	135200	8.066	191.308	0.096	28.193	29.669	298.701	66.714
52	10/14/1999	135300	8.092	191.307	0.097	28.416	29.667	298.575	66.714
53	10/14/1999	135400	8.087	190.903	0.096	28.250	29.666	298.097	66.714
54	10/14/1999	135500	8.081	190.650	0.096	28.105	29.663	299.713	66.714
55	10/14/1999	135600	8.068	190.865	0.096	28.059	29.664	302.472	66.714
56	10/14/1999	135700	8.061	191.065	0.095	27.908	29.663	302.557	66.714
57	10/14/1999	135800	8.051	191.068	0.096	27.918	29.665	302.806	66.714
58	10/14/1999	135900	8.067	191.455	0.096	27.965	29.661	301.798	66.714

59	10/14/1999	140000	8.042	190.982	0.096	27.932	29.662	297.004	66.714	
60	10/14/1999	140100	8.041	191.226	0.095	27.772	29.662	297.681	66.714	
61	/	/								
62	/	/	AVE	8.093	191.192	0.095	27.857	29.675	299.697	66.714

Record#	DATE	TIME	PC1CO211	PC1GEN12	PC1NOX13	PC1NOX14	PC1PRS15	PC1TMP16	PC1SYN17
1	10/14/1999	141700	8.043	191.411	0.095	27.809	29.663	296.801	66.714
2	10/14/1999	141800	8.057	191.314	0.095	27.703	29.661	297.234	66.714
3	10/14/1999	141900	8.079	191.184	0.096	28.006	29.660	298.595	66.714
4	10/14/1999	142000	8.078	191.386	0.097	28.329	29.662	298.320	66.714
5	10/14/1999	142100	8.090	191.345	0.096	28.215	29.662	296.961	66.714
6	10/14/1999	142200	8.097	191.088	0.095	28.001	29.662	297.161	66.714
7	10/14/1999	142300	8.068	191.161	0.096	28.188	29.658	300.173	66.714
8	10/14/1999	142400	8.039	191.237	0.096	28.013	29.661	300.036	66.714
9	10/14/1999	142500	8.035	191.136	0.095	27.797	29.662	298.797	66.714
10	10/14/1999	142600	8.055	191.179	0.095	27.813	29.661	298.828	66.714
11	10/14/1999	142700	8.057	190.998	0.095	27.875	29.661	297.809	66.714
12	10/14/1999	142800	8.069	191.262	0.096	27.985	29.660	297.833	66.714
13	10/14/1999	142900	8.060	191.133	0.096	28.023	29.657	301.251	66.714
14	10/14/1999	143000	8.047	191.235	0.095	27.790	29.658	301.380	66.714
15	10/14/1999	143100	8.041	190.925	0.096	27.903	29.658	299.841	66.714
16	10/14/1999	143200	8.036	191.056	0.096	27.939	29.657	299.701	66.714
17	10/14/1999	143300	8.065	190.901	0.096	28.020	29.657	299.199	66.714
18	10/14/1999	143400	8.070	191.102	0.095	27.849	29.655	299.070	66.714
19	10/14/1999	143500	8.076	191.270	0.095	27.906	29.654	298.466	66.714
20	10/14/1999	143600	8.102	191.070	0.095	27.778	29.657	298.197	66.714
21	10/14/1999	143700	8.079	191.061	0.095	27.865	29.655	297.980	66.714
22	10/14/1999	143800	8.094	190.902	0.095	27.964	29.656	297.811	66.714
23	10/14/1999	143900	8.116	191.303	0.095	27.950	29.657	298.630	66.714
24	10/14/1999	144000	8.100	191.075	0.094	27.698	29.659	299.202	66.714
25	10/14/1999	144100	8.142	190.889	0.095	28.055	29.656	299.822	66.714
26	10/14/1999	144200	8.124	191.739	0.095	28.020	29.657	301.013	66.714
27	10/14/1999	144300	8.134	190.449	0.095	28.066	29.656	297.669	66.714
28	10/14/1999	144400	8.125	189.993	0.095	28.052	29.655	294.282	66.714
29	10/14/1999	144500	8.123	191.238	0.094	27.812	29.658	296.112	66.714
30	10/14/1999	144600	8.123	190.929	0.094	27.750	29.654	298.645	66.714
31	10/14/1999	144700	8.103	191.251	0.095	28.026	29.654	299.432	66.714
32	10/14/1999	144800	8.086	190.920	0.095	27.790	29.656	301.341	66.714
33	10/14/1999	144900	8.109	191.434	0.094	27.581	29.657	301.224	66.714
34	10/14/1999	145000	8.125	191.158	0.094	27.756	29.655	300.905	66.714
35	10/14/1999	145100	8.111	191.081	0.094	27.745	29.653	300.880	66.714
36	10/14/1999	145200	8.118	191.253	0.095	28.063	29.653	300.624	66.714
37	10/14/1999	145300	8.110	191.134	0.094	27.558	29.654	300.706	66.714
38	10/14/1999	145400	8.109	191.261	0.094	27.713	29.654	302.390	66.714
39	10/14/1999	145500	8.092	191.305	0.094	27.645	29.654	302.490	66.714
40	10/14/1999	145600	8.108	191.293	0.094	27.490	29.652	298.918	66.714
41	10/14/1999	145700	8.083	191.304	0.094	27.508	29.652	298.813	66.714
42	10/14/1999	145800	8.077	191.297	0.094	27.413	29.654	297.827	66.714
43	10/14/1999	145900	8.066	191.160	0.094	27.381	29.650	297.678	66.714
44	10/14/1999	150000	8.036	191.350	0.093	27.222	29.649	299.248	66.714
45	10/14/1999	150100	8.033	190.999	0.094	27.381	29.649	299.907	66.714
46	10/14/1999	150200	8.029	191.159	0.094	27.380	29.647	299.984	66.714
47	10/14/1999	150300	8.030	191.282	0.095	27.693	29.648	300.073	66.714
48	10/14/1999	150400	8.051	191.095	0.094	27.453	29.648	301.579	66.714
49	10/14/1999	150500	8.037	191.434	0.094	27.470	29.647	301.999	66.714
50	10/14/1999	150600	8.055	191.627	0.094	27.540	29.647	298.109	66.714
51	10/14/1999	150700	8.071	191.397	0.094	27.609	29.650	297.244	66.714
52	10/14/1999	150800	8.067	191.125	0.094	27.381	29.648	299.716	66.714
53	10/14/1999	150900	8.048	191.186	0.093	27.169	29.649	300.760	66.714
54	10/14/1999	151000	8.088	191.524	0.094	27.467	29.649	302.466	66.714
55	10/14/1999	151100	8.061	191.281	0.093	27.265	29.646	303.489	66.714
56	10/14/1999	151200	8.051	191.116	0.094	27.439	29.646	301.761	66.714
57	10/14/1999	151300	8.049	191.516	0.093	27.286	29.650	300.126	66.714
58	10/14/1999	151400	8.042	191.441	0.094	27.374	29.648	300.280	66.714

59	10/14/1999	151500	8.047	191.077	0.094	27.365	29.649	300.377	66.714	
60	10/14/1999	151600	8.070	190.896	0.094	27.493	29.648	299.737	66.714	
61	/	/								
62	/	/	AVE	8.076	191.172	0.095	27.731	29.654	299.448	66.714

APPENDIX C

FIELD DATA SHEETS

APPENDIX C - 1 UNCORRECTED REFERENCE METHOD DATA SHEETS

APPENDIX C - 1

UNCORRECTED REFERENCE METHOD DATA SHEETS

POLK POWER STATION NOX BACT STUDY

10-14-1999

CHAN 3
STACK

<u>TIME</u>	<u>%O2</u>
09:05	12.42
09:06	12.45
09:07	12.46
09:08	12.48
09:09	12.47
09:10	12.48
09:11	12.52
09:12	12.53
09:13	12.52
09:14	12.49
09:15	12.50
09:16	12.49

AVERAGE VALUES FOR THE LAST 12 MINUTES

09:16 12.48

COMMENTS: O2 TRAVERSE
WEST PORT

POLK POWER STATION NOX BACT STUDY

10-14-1999

CHAN 3

STACK

<u>TIME</u>	<u>%O2</u>
09:28	12.34
09:29	12.34
09:30	12.34
09:31	12.34
09:32	12.35
09:33	12.35
09:34	12.34
09:35	12.35
09:36	12.33
09:37	12.34
09:38	12.32
09:39	12.38

AVERAGE VALUES FOR THE LAST 12 MINUTES

09:39 12.34

COMMENTS: O2 TRAVERSE
SOUTH PORT

POLK POWER STATION NOX BACT STUDY

10-14-1999

CHAN 3
STACK

<u>TIME</u>	<u>%O2</u>
10:22	12.31
10:23	12.35
10:24	12.32
10:25	12.33
10:26	12.32
10:27	12.34
10:28	12.33
10:29	12.33
10:30	12.31
10:31	12.28
10:32	12.31
10:33	12.53

AVERAGE VALUES FOR THE LAST 12 MINUTES

10:33 12.34

COMMENTS: O2 TRAVERSE
EAST PORT

POLK POWER STATION NOX BACT STUDY

10-14-1999

CHAN 3
STACK
TIME %O2

10:22	12.31
10:23	12.35
10:24	12.32
10:25	12.33
10:26	12.32
10:27	12.34
10:28	12.33
10:29	12.33
10:30	12.31
10:31	12.28
10:32	12.31
10:33	12.53

AVERAGE VALUES FOR THE LAST 12 MINUTES
10:33 12.34

COMMENTS: O2 TRAVERSE
EAST PORT

POLK POWER STATION NOX BACT STUDY

10-14-1999

TIME	CHAN 3 STACK %O2	CHAN 6 STACK ppmNOX	STACK ppmNOX @15%O2
11:50	11.89	26.8	17.5
11:51	11.89	27.0	17.7
11:52	11.89	26.8	17.6
11:53	11.90	27.0	17.7
11:54	11.91	27.1	17.8
11:55	11.89	26.9	17.6
11:56	11.90	26.9	17.6
11:57	11.90	26.9	17.6
11:58	11.90	27.2	17.8
11:59	11.89	26.9	17.6
12:00	11.89	26.7	17.5
12:01	11.89	26.7	17.5
12:02	11.89	27.1	17.8
12:03	11.89	27.0	17.7
12:04	11.89	26.7	17.5
12:05	11.89	27.1	17.8
12:06	11.88	26.7	17.5
12:07	11.88	26.7	17.5
12:08	11.89	26.8	17.6
12:09	11.89	27.2	17.8
12:10	11.88	27.3	17.9
12:11	11.87	27.1	17.7
12:12	11.89	27.1	17.7
12:13	11.89	27.3	17.9
12:14	11.86	26.6	17.4
12:15	11.97	26.4	17.4
12:16	11.93	26.8	17.6
12:17	11.89	26.6	17.4
12:18	11.88	26.4	17.3
12:19	11.88	26.8	17.5
12:20	11.91	27.2	17.8
12:21	11.87	26.8	17.5
12:22	11.87	27.0	17.7
12:23	11.89	27.2	17.8
12:24	11.89	27.3	17.9
12:25	11.89	27.2	17.8
12:26	11.87	27.2	17.8
12:27	11.88	27.2	17.8
12:28	11.88	27.2	17.8
12:29	11.87	27.2	17.8
12:30	11.88	27.4	17.9
12:31	11.87	26.9	17.6
12:32	11.87	27.0	17.6
12:33	11.88	27.3	17.9
12:34	11.89	27.2	17.8
12:35	11.86	26.9	17.5
12:36	11.87	27.2	17.7
12:37	11.86	26.9	17.5
12:38	11.87	27.2	17.7
12:39	11.85	26.8	17.5
12:40	11.87	27.0	17.7
12:41	11.87	27.1	17.7
12:42	11.86	27.0	17.6
12:43	11.86	26.9	17.6
12:44	11.87	26.9	17.5

POLK POWER STATION NOX BACT STUDY

10-14-1999

	CHAN 3	CHAN 6	STACK
	STACK	STACK	ppmNOX
TIME	%O2	ppmNOX	@15%O2
12:45	11.85	26.9	17.6
12:46	11.86	27.0	17.6
12:47	11.85	26.9	17.5
12:48	11.88	27.1	17.7
12:49	11.87	27.1	17.7

AVERAGE VALUES FOR THE LAST HOUR: 60 MINUTES OF VALID DATA

12:49	11.88	27.0	17.7
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COMMENTS: END RUN ONE

POLK POWER STATION NOX BACT STUDY

10-14-1999

TIME	CHAN 3 STACK %O2	CHAN 6 STACK ppmNOX	STACK ppmNOX @15%O2
13:02	11.86	26.9	17.6
13:03	11.86	27.0	17.6
13:04	11.86	27.1	17.7
13:05	11.86	27.1	17.7
13:06	11.86	27.1	17.7
13:07	11.86	26.9	17.6
13:08	11.86	27.0	17.6
13:09	11.85	26.9	17.5
13:10	11.85	26.9	17.5
13:11	11.85	26.8	17.4
13:12	11.85	26.8	17.5
13:13	11.86	27.1	17.7
13:14	11.85	26.9	17.5
13:15	11.85	27.0	17.6
13:16	11.85	27.0	17.6
13:17	11.86	26.9	17.6
13:18	11.85	27.1	17.7
13:19	11.86	27.2	17.7
13:20	11.85	27.0	17.6
13:21	11.86	27.0	17.6
13:22	11.85	27.1	17.7
13:23	11.87	27.2	17.8
13:24	11.86	27.2	17.8
13:25	11.86	27.1	17.7
13:26	11.87	27.2	17.7
13:27	11.87	27.1	17.7
13:28	11.87	26.9	17.6
13:29	11.88	27.2	17.8
13:30	11.86	26.9	17.5
13:31	11.87	27.2	17.8
13:32	11.87	27.4	17.9
13:33	11.86	27.0	17.6
13:34	11.84	26.8	17.4
13:35	11.88	27.3	17.8
13:36	11.84	26.8	17.5
13:37	11.84	27.0	17.6
13:38	11.87	27.4	17.9
13:39	11.87	27.5	18.0
13:40	11.83	27.0	17.6
13:41	11.84	27.2	17.7
13:42	11.83	27.2	17.7
13:43	11.82	27.1	17.6
13:44	11.83	27.3	17.7
13:45	11.83	27.2	17.7
13:46	11.84	27.2	17.7
13:47	11.85	27.4	17.8
13:48	11.84	27.4	17.9
13:49	11.85	27.5	17.9
13:50	11.86	27.8	18.1
13:51	11.85	27.7	18.1
13:52	11.83	27.5	17.9
13:53	11.84	27.5	17.9
13:54	11.84	27.5	17.9
13:55	11.83	27.4	17.9
13:56	11.84	27.4	17.8

POLK POWER STATION NOX BACT STUDY

10-14-1999

TIME	CHAN 3 STACK %O2	CHAN 6 STACK ppmNOX	STACK ppmNOX @15%O2
13:57	11.83	27.6	17.9
13:58	11.84	27.5	17.9
13:59	11.85	27.6	18.0
14:00	11.84	27.4	17.9
14:01	11.84	27.5	17.9

 AVERAGE VALUES FOR THE LAST HOUR: 60 MINUTES OF VALID DATA

14:01	11.85	27.2	17.7
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COMMENTS: END RUN TWO

POLK POWER STATION NOX BACT STUDY

10-14-1999

TIME	CHAN 3 STACK %O2	CHAN 6 STACK ppmNOX	STACK ppmNOX @15%O2
14:17	11.84	27.9	18.2
14:18	11.84	28.1	18.3
14:19	11.85	28.3	18.4
14:20	11.85	28.2	18.4
14:21	11.85	28.2	18.4
14:22	11.85	28.2	18.4
14:23	11.85	28.0	18.2
14:24	11.84	28.0	18.2
14:25	11.84	28.1	18.3
14:26	11.83	28.0	18.2
14:27	11.85	28.2	18.4
14:28	11.85	28.2	18.4
14:29	11.85	28.2	18.4
14:30	11.83	28.0	18.3
14:31	11.85	28.2	18.4
14:32	11.83	28.2	18.3
14:33	11.83	28.3	18.4
14:34	11.83	28.0	18.2
14:35	11.83	28.0	18.2
14:36	11.84	28.1	18.3
14:37	11.82	28.0	18.2
14:38	11.83	28.0	18.2
14:39	11.83	27.9	18.2
14:40	11.83	28.1	18.3
14:41	11.84	28.1	18.3
14:42	11.82	28.0	18.2
14:43	11.83	28.1	18.3
14:44	11.83	27.9	18.1
14:45	11.84	28.1	18.3
14:46	11.84	28.1	18.3
14:47	11.84	28.0	18.2
14:48	11.84	27.9	18.2
14:49	11.84	28.1	18.3
14:50	11.85	28.1	18.3
14:51	11.83	27.8	18.1
14:52	11.85	28.0	18.3
14:53	11.84	27.9	18.2
14:54	11.83	27.9	18.2
14:55	11.83	27.8	18.1
14:56	11.84	27.7	18.0
14:57	11.85	27.9	18.2
14:58	11.82	27.7	18.0
14:59	11.85	28.1	18.3
15:00	11.84	28.0	18.2
15:01	11.85	28.3	18.4
15:02	11.83	28.0	18.2
15:03	11.82	28.1	18.2
15:04	11.83	28.1	18.3
15:05	11.83	28.3	18.4
15:06	11.81	27.9	18.1
15:07	11.81	27.7	18.0
15:08	11.81	27.9	18.1
15:09	11.80	27.8	18.0
15:10	11.80	27.8	18.0
15:11	11.82	27.8	18.1

POLK POWER STATION NOX BACT STUDY
CHAN 3 CHAN 6 STACK
STACK STACK ppmNOX
TIME %O2 ppmNOX @15%O2

10-14-1999

15:12	11.83	27.9	18.1
15:13	11.83	28.1	18.3
15:14	11.82	28.0	18.2
15:15	11.84	28.2	18.3
15:16	11.84	28.3	18.4

AVERAGE VALUES FOR THE LAST HOUR: 60 MINUTES OF VALID DATA
15:16 11.83 28.0 18.2

COMMENTS: END RUN THREE

APPENDIX D

SAMPLING EQUIPMENT CALIBRATIONS

- APPENDIX D-1 LINEARITY CALIBRATIONS
- APPENDIX D-2 DRIFT ASSESSMENT CALS
- APPENDIX D-3 CYLINDER GAS CERTIFICATION
- APPENDIX D-4 CONVERTER EFFICIENCY RESULTS

APPENDIX D-1
LINEARITY CALIBRATIONS

CALIBRATION SUMMARY

SOURCE: POLK POWER STATION NOX BACT STUDY

REASON: DAILY DIRECT CALIBRATION

DATE : 10-14-1999 TIME: 06:50 - 07:13

A/D CHAN	MONITOR DESCRIPTION	UNITS	GAS VALUE	MONITOR RESPONSE
3	STACK	%O2	0.00	0.04
3	STACK	%O2	11.96	12.06
3	STACK	%O2	23.10	23.18
6	STACK	ppmNOX	0.0	-1.2
6	STACK	ppmNOX	24.0	25.3
6	STACK	ppmNOX	48.5	50.0
6	STACK	ppmNOX	81.1	81.8

CALIBRATION SUMMARY

SOURCE: POLK POWER STATION NOX BACT STUDY

REASON: DAILY SYSTEM CALIBRATION

DATE : 10-14-1999 TIME: 08:45 - 08:54

A/D CHAN	MONITOR DESCRIPTION	UNITS	GAS VALUE	MONITOR RESPONSE
3	STACK	%O2	0.00	0.03
3	STACK	%O2	11.96	12.14
3	STACK	%O2	23.10	23.08
6	STACK	ppmNOX	0.0	-0.3
6	STACK	ppmNOX	24.0	25.6
6	STACK	ppmNOX	48.5	49.7
6	STACK	ppmNOX	81.1	81.3

CALIBRATION SUMMARY

SOURCE: POLK POWER STATION NOX BACT STUDY

REASON: SYSTEM CAL REPEAT

DATE : 10-14-1999 TIME: 11:32 - 11:45

A/D CHAN	MONITOR DESCRIPTION	UNITS	GAS VALUE	MONITOR RESPONSE
3	STACK	%O2	0.00	0.05
3	STACK	%O2	11.96	12.14
3	STACK	%O2	23.10	23.07
6	STACK	ppmNOX	0.0	0.7
6	STACK	ppmNOX	24.0	25.3
6	STACK	ppmNOX	48.5	48.9
6	STACK	ppmNOX	81.1	80.7

APPENDIX D-2
DRIFT ASSESSMENT CALS

CALIBRATION SUMMARY

SOURCE: POLK POWER STATION NOX BACT STUDY

REASON: POST-O2 TRAVERSE CAL

DATE : 10-14-1999 TIME: 10:37 - 10:47

A/D CHAN	MONITOR DESCRIPTION	UNITS	GAS VALUE	MONITOR RESPONSE
3	STACK	%O2	0.00	0.03
3	STACK	%O2	11.96	12.12
6	STACK	ppmNOX	0.0	2.6
6	STACK	ppmNOX	24.0	27.1

SYSTEM CALIBRATION BIAS AND DRIFT CALCULATIONS

SOURCE: POLK POWER STATION UNIT 1 BACT STUDY

TEST DATE: 10/14/99

RUN NUMBER: 1

SPAN VALUES: 100 ppm NOx
25 % Oxygen

	-----INITIAL VALUES-----			-----FINAL VALUES-----		
	ANALYZER CAL. RESPONSE	SYSTEM CAL. RESPONSE	SYSTEM CAL. BIAS (% OF SPAN)	SYSTEM CAL. RESPONSE	SYSTEM CAL. BIAS (% OF SPAN)	DRIFT (% OF SPAN)
NOx ZERO GAS	0.7	0.7	0.00	1.2	0.50	0.50
NOx UP-SCALE	25.3	25.3	0.00	25.4	0.10	0.10
O2 LOW GAS	0.05	0.05	0.00	0.02	-0.12	-0.12
O2 UP-SCALE	12.14	12.14	0.00	12.10	-0.16	-0.16

$$\text{SYSTEM CAL. BIAS} = \frac{\text{SYSTEM CAL. RESPONSE} - \text{ANALYZER CAL. RESPONSE}}{\text{SPAN}} \times 100$$

$$\text{DRIFT} = \frac{\text{FINAL SYSTEM CAL. RESPONSE} - \text{INITIAL CAL. RESPONSE}}{\text{SPAN}} \times 100$$

SYSTEM CALIBRATION BIAS AND DRIFT CALCULATIONS

SOURCE: POLK POWER STATION UNT 1 BACT STUDY

TEST DATE: 10/14/99

RUN NUMBER: 1

SPAN VALUE: 25 % Oxygen

	-----INITIAL VALUES-----			-----FINAL VALUES-----		
	ANALYZER CAL. RESPONSE	SYSTEM CAL. RESPONSE	SYSTEM CAL. BIAS (% OF SPAN)	SYSTEM CAL. RESPONSE	SYSTEM CAL. BIAS (% OF SPAN)	DRIFT (% OF SPAN)
O2 ZERO GAS	0.05	0.05	0.00	0.02	-0.12	-0.12
O2 UP-SCALE	12.14	12.14	0.00	12.10	-0.16	-0.16

$$\text{SYSTEM CAL. BIAS} = \frac{\text{SYSTEM CAL. RESPONSE} - \text{ANALYZER CAL. RESPONSE}}{\text{SPAN}} \times 100$$

$$\text{DRIFT} = \frac{\text{FINAL SYSTEM CAL. RESPONSE} - \text{INITIAL CAL. RESPONSE}}{\text{SPAN}} \times 100$$

CALIBRATION SUMMARY

SOURCE: POLK POWER STATION NOX BACT STUDY

REASON: RUN ONE DRIFT CAL

DATE : 10-14-1999 TIME: 12:49 - 12:54

A/D CHAN	MONITOR DESCRIPTION	UNITS	GAS VALUE	MONITOR RESPONSE
3	STACK	%O2	0.00	0.02
3	STACK	%O2	11.96	12.10
6	STACK	ppmNOX	0.0	1.2
6	STACK	ppmNOX	24.0	25.4

SYSTEM CALIBRATION BIAS AND DRIFT CALCULATIONS

SOURCE: POLK POWER STATION UNIT 1 BACT STUDY

TEST DATE: 10/14/99

RUN NUMBER: 2

SPAN VALUES: 100 ppm NOx
25 % Oxygen

	—INITIAL VALUES—			—FINAL VALUES—		
	ANALYZER CAL. RESPONSE	SYSTEM CAL. RESPONSE	SYSTEM CAL. BIAS (% OF SPAN)	SYSTEM CAL. RESPONSE	SYSTEM CAL. BIAS (% OF SPAN)	DRIFT (% OF SPAN)
NOx ZERO GAS	0.7	1.2	0.50	2.0	1.30	0.80
NOx UP-SCALE	25.3	25.4	0.10	25.8	0.50	0.40
O2 LOW GAS	0.05	0.02	-0.12	0.02	-0.12	0.00
O2 UP-SCALE	12.14	12.10	-0.16	12.09	-0.20	-0.04

$$\text{SYSTEM CAL. BIAS} = \frac{\text{SYSTEM CAL. RESPONSE} - \text{ANALYZER CAL. RESPONSE}}{\text{SPAN}} \times 100$$

$$\text{DRIFT} = \frac{\text{FINAL SYSTEM CAL. RESPONSE} - \text{INITIAL CAL. RESPONSE}}{\text{SPAN}} \times 100$$

SYSTEM CALIBRATION BIAS AND DRIFT CALCULATIONS

SOURCE: POLK POWER STATION UNT 1 BACT STUDY

TEST DATE: 10/14/99

RUN NUMBER: 2

SPAN VALUE: 25 % Oxygen

	-----INITIAL VALUES-----			-----FINAL VALUES-----		
	ANALYZER CAL. RESPONSE	SYSTEM CAL. RESPONSE	SYSTEM CAL. BIAS (% OF SPAN)	SYSTEM CAL. RESPONSE	SYSTEM CAL. BIAS (% OF SPAN)	DRIFT (% OF SPAN)
O2 ZERO GAS	0.05	0.02	-0.12	0.02	-0.12	0.00
O2 UP-SCALE	12.14	12.10	-0.16	12.09	-0.20	-0.04

$$\text{SYSTEM CAL. BIAS} = \frac{\text{SYSTEM CAL. RESPONSE} - \text{ANALYZER CAL. RESPONSE}}{\text{SPAN}} \times 100$$

$$\text{DRIFT} = \frac{\text{FINAL SYSTEM CAL. RESPONSE} - \text{INITIAL CAL. RESPONSE}}{\text{SPAN}} \times 100$$

CALIBRATION SUMMARY

SOURCE: POLK POWER STATION NOX BACT STUDY

REASON: RUN TWO DRIFT CAL

DATE : 10-14-1999 TIME: 14:02 - 14:08

A/D CHAN	MONITOR DESCRIPTION	UNITS	GAS VALUE	MONITOR RESPONSE
3	STACK	%O2	0.00	0.02
3	STACK	%O2	11.96	12.09
6	STACK	ppmNOX	0.0	2.0
6	STACK	ppmNOX	24.0	25.8

SYSTEM CALIBRATION BIAS AND DRIFT CALCULATIONS

SOURCE: POLK POWER STATION UNIT 1 BACT STUDY

TEST DATE: 10/14/99

RUN NUMBER: 3

SPAN VALUES: 100 ppm NOx
25 % Oxygen

	-----INITIAL VALUES-----			-----FINAL VALUES-----		
	ANALYZER CAL. RESPONSE	SYSTEM CAL. RESPONSE	SYSTEM CAL. BIAS (% OF SPAN)	SYSTEM CAL. RESPONSE	SYSTEM CAL. BIAS (% OF SPAN)	DRIFT (% OF SPAN)
NOx ZERO GAS	0.7	2.0	1.30	2.9	2.20	0.90
NOx UP-SCALE	25.3	25.8	0.50	26.6	1.30	0.80
O2 LOW GAS	0.05	0.02	-0.12	0.03	-0.08	0.04
O2 UP-SCALE	12.14	12.09	-0.20	12.08	-0.24	-0.04

$$\text{SYSTEM CAL. BIAS} = \frac{\text{SYSTEM CAL. RESPONSE} - \text{ANALYZER CAL. RESPONSE}}{\text{SPAN}} \times 100$$

$$\text{DRIFT} = \frac{\text{FINAL SYSTEM CAL. RESPONSE} - \text{INITIAL CAL. RESPONSE}}{\text{SPAN}} \times 100$$

SYSTEM CALIBRATION BIAS AND DRIFT CALCULATIONS

SOURCE: POLK POWER STATION UNT 1 BACT STUDY

TEST DATE: 10/14/99

RUN NUMBER: 3

SPAN VALUE: 25 % Oxygen

	-----INITIAL VALUES-----			-----FINAL VALUES-----		
	ANALYZER CAL. RESPONSE	SYSTEM CAL. RESPONSE	SYSTEM CAL. BIAS (% OF SPAN)	SYSTEM CAL. RESPONSE	SYSTEM CAL. BIAS (% OF SPAN)	DRIFT (% OF SPAN)
O2 ZERO GAS	0.05	0.02	-0.12	0.03	-0.08	0.04
O2 UP-SCALE	12.14	12.09	-0.20	12.08	-0.24	-0.04

$$\text{SYSTEM CAL. BIAS} = \frac{\text{SYSTEM CAL. RESPONSE} - \text{ANALYZER CAL. RESPONSE}}{\text{SPAN}} \times 100$$

$$\text{DRIFT} = \frac{\text{FINAL SYSTEM CAL. RESPONSE} - \text{INITIAL CAL. RESPONSE}}{\text{SPAN}} \times 100$$

CALIBRATION SUMMARY

SOURCE: POLK POWER STATION NOX BACT STUDY

REASON: RUN THREE DRIFT CAL

DATE : 10-14-1999 TIME: 15:16 - 15:21

A/D CHAN	MONITOR DESCRIPTION	UNITS	GAS VALUE	MONITOR RESPONSE
3	STACK	%O2	0.00	0.03
3	STACK	%O2	11.96	12.08
6	STACK	ppmNOX	0.0	2.9
6	STACK	ppmNOX	24.0	26.6

CONTINUOUS EMISSIONS MONITORING SET-UP

SOURCE: POLK POWER STATION NOX BACT STUDY

DATE: 10-13-1999 TIME: 12:08

A/D CHAN	DESCRIP	UNITS	SPAN	INPUT VOLTAGE	ZERO OFFSET
3	STACK	%O2	25	1.00 V	0%
6	STACK	ppmNOX	100	10.00 V	0%

AVERAGING PERIODS: ONE HOUR,

DILUTION CORRECTION 1: ppmNOX at 15% O2 STACK

$$C = (\text{ppmNOX}) \left(\frac{5.9}{20.9 - \%O2} \right)$$

ppmNOX from A/D Channel 6

%O2 from A/D Channel 3

APPENDIX D-3
CYLINDER GAS CERTIFICATION

RATA CLASS

Dual-Analyzed Calibration Standard



Scott Specialty Gases

1750 EAST CLUB BLVD, DURHAM, NC 27704

Phone: 919-220-0803

Fax: 919-220-0808

CERTIFICATE OF ACCURACY: EPA Protocol Gas

Assay Laboratory

SCOTT SPECIALTY GASES
1750 EAST CLUB BLVD
DURHAM, NC 27704

P.O. No.: E-N31293

Project No.: 12-32332-014

Customer

TAMPA ELECTRIC CO
RAY MCDARBY
5010 CAUSEWAY BLVD
TAMPA FL 33619

ANALYTICAL INFORMATION

This certification was performed according to EPA Traceability Protocol For Assay & Certification of Gaseous Calibration Standards; Procedure #G1; September, 1997.

Cylinder Number: ALM045301 Certification Date: 2/08/99 Exp. Date: 2/07/2001
Cylinder Pressure***: 1940 PSIG

COMPONENT	CERTIFIED CONCENTRATION	ANALYTICAL ACCURACY**	TRACEABILITY
NITRIC OXIDE	24.0 PPM	+/- 1%	NIST
NITROGEN - OXYGEN FREE	BALANCE		
NOX	24.9 BALANCE		Reference Value Only

*** Do not use when cylinder pressure is below 150 psig.

** Analytical accuracy is inclusive of usual known error sources which at least include precision of the measurement processes.

Product certified as +/- 1% analytical accuracy is directly traceable to NIST standards.

REFERENCE STANDARD

TYPE/SRM NO.	EXPIRATION DATE	CYLINDER NUMBER	CONCENTRATION	COMPONENT
NTRM 2629	4/09/99	ALM067006	21.48 PPM	NITRIC OXIDE

INSTRUMENTATION

INSTRUMENT/MODEL/SERIAL#	DATE LAST CALIBRATED	ANALYTICAL PRINCIPLE
HORIBA/CLA53A/850658093	02/08/99	CHEMILUMINESCENT

ANALYZER READINGS

(Z = Zero Gas R = Reference Gas T = Test Gas r = Correlation Coefficient)

First Triad Analysis

Second Triad Analysis

Calibration Curve

NITRIC OXIDE

Date: 02/01/99	Response Unit: PPM	
Z1 = 0.0500	R1 = 21.580	T1 = 24.100
R2 = 21.510	Z2 = 0.0300	T2 = 23.990
Z3 = 0.0300	T3 = 24.010	R3 = 21.520
Avg. Concentration:	23.97	PPM

Date: 02/08/99	Response Unit: PPM	
Z1 = 0.1900	R1 = 21.400	T1 = 24.050
R2 = 21.410	Z2 = 0.1600	T2 = 24.040
Z3 = 0.1600	T3 = 24.010	R3 = 21.410
Avg. Concentration:	24.09	PPM

Concentration = A + Bx + Cx ² + Dx ³ + Ex ⁴	
r = 0.999990	
Constants:	A = 0.000000
B = 1.000000	C = 0.000000
D = 0.000000	E = 0.000000

Special Notes:

APPROVED BY: Greg T Barnett
G BARNETT



Scott Specialty Gases

1750 EAST CLUB BLVD, DURHAM, NC 27704

Phone: 919-220-0803

Fax: 919-220-0808

CERTIFICATE OF ANALYSIS: Interference-Free TM EPA Protocol Gas

Customer

TAMPA ELECTRIC CO

5010 CAUSEWAY BLVD

TAMPA, FL 33619

Assay Laboratory

SCOTT SPECIALTY GASES
1750 EAST CLUB BLVD
DURHAM, NC 27704

Project No.: 12-29096-001

P.O. No.: N31923

ANALYTICAL INFORMATION

This certification was performed according to EPA Traceability Protocol For Assay & Certification of Gaseous Calibration Standards; Procedure #G1; September, 1993.

Cylinder Number: ALM049879
Cylinder Pressure***: 1934 PSIG

Certification Date: 6/09/98

Exp. Date: 6/09/2000

<u>COMPONENT</u>	<u>CERTIFIED CONCENTRATION</u>	<u>ANALYTICAL ACCURACY**</u>
NITRIC OXIDE	48.47 PPM	+/- 1% NIST Traceable
OXIDES OF NITROGEN	49.3 PPM	Reference Value
NITROGEN - OXYGEN FREE	BALANCE	

*** Do not use when cylinder pressure is below 150 psig.

** Analytical accuracy is inclusive of usual known error sources which at least include precision of the measurement processes.

Product certified as +/- 1% analytical accuracy is directly traceable to NIST standards.

REFERENCE STANDARD

<u>TYPE/SRM NO.</u>	<u>EXPIRATION DATE</u>	<u>CYLINDER NUMBER</u>	<u>CONCENTRATION</u>	<u>COMPONENT</u>
NTRM 1684	4/03/99	ALM065500	99.80 PPM	NO/N2

INSTRUMENTATION

<u>INSTRUMENT/MODEL/SERIAL#</u>	<u>LAST DATE CALIBRATED</u>	<u>ANALYTICAL PRINCIPLE</u>
FTIR System/8220/AAB9400252	05/26/98	Scott Enhanced FTIR

ANALYZER READINGS

(Z = Zero Gas R = Reference Gas T = Test Gas r = Correlation Coefficient)

First Triad Analysis

Second Triad Analysis

Calibration Curve

NITRIC OXIDE

Date: 06/02/98	Response Unit: PPM	
Z1 = 0.2635	R1 = 99.772	T1 = 48.421
R2 = 99.768	Z2 = 0.1417	T2 = 48.510
Z3 = 0.2299	T3 = 48.526	R3 = 99.860
Avg. Concentration:	48.49	PPM

Date: 06/09/98	Response Unit: PPM	
Z1 = 0.2992	R1 = 99.842	T1 = 48.564
R2 = 99.860	Z2 = 0.1898	T2 = 48.433
Z3 = 0.3443	T3 = 48.399	R3 = 99.698
Avg. Concentration:	48.47	PPM

Concentration = A + Bx + Cx ² + Dx ³ + Ex ⁴	
r = 0.999990	
Constants:	A = 0.000000
B = 1.000000	C = 0.000000
D = 0.000000	E = 0.000000

Special Notes:

ANALYST: *B.M. Becton*
B.M. Becton



Scott Specialty Gases

1750 EAST CLUB BLVD, DURHAM, NC 27704

Phone: 919-220-0803

Fax: 919-220-0808

RATA CLASS *ES-HARD-3*

Dual-Analyzed Calibration Standard

CERTIFICATE OF ACCURACY: Interference Free TM EPA Protocol Gas

Assay Laboratory

SCOTT SPECIALTY GASES
1750 EAST CLUB BLVD
DURHAM, NC 27704

P.O. No.: N31923
Project No.: 12-35046-001

Customer

TAMPA ELECTRIC CO
5010 CAUSEWAY BLVD
TAMPA FL 33619

ANALYTICAL INFORMATION

This certification was performed according to EPA Traceability Protocol For Assay & Certification of Gaseous Calibration Standards; Procedure #G1; September, 1997.

Cylinder Number: ALM019127 Certification Date: 7/19/99 Exp. Date: 7/18/2001
Cylinder Pressure***: 1994 PSIG

ANALYTICAL

COMPONENT	CERTIFIED CONCENTRATION (Moles)	ACCURACY**	TRACEABILITY
NITRIC OXIDE	81.13 PPM	+/- 1%	Direct NIST and NMI
NITROGEN - OXYGEN FREE	BALANCE		
TOTAL OXIDES OF NITROGEN	81.82 PPM		Reference Value Only

*** Do not use when cylinder pressure is below 150 psig.

** Analytical accuracy is based on the requirements of EPA Protocol procedure G1, September 1997.

Product certified as +/- 1% analytical accuracy is directly traceable to NIST or NMI standards.

REFERENCE STANDARD

TYPE/SRM NO.	EXPIRATION DATE	CYLINDER NUMBER	CONCENTRATION	COMPONENT
NTRM1683	4/03/03	ALM020566	48.90 PPM	NO/N2

INSTRUMENTATION

INSTRUMENT/MODEL/SERIAL#	DATE LAST CALIBRATED	ANALYTICAL PRINCIPLE
FTIR System/8220/AAB9400252	07/15/99	Scott Enhanced FTIR

ANALYZER READINGS

(Z = Zero Gas R = Reference Gas T = Test Gas r = Correlation Coefficient)

First Triad Analysis

Second Triad Analysis

Calibration Curve

NITRIC OXIDE

Date: 07/12/99	Response Unit: PPM		
Z1 = 0.1222	R1 = 48.911	T1 = 80.909	
R2 = 48.792	Z2 = -0.077	T2 = 81.157	
Z3 = 0.1565	T3 = 81.343	R3 = 48.996	
Avg. Concentration:	81.14	PPM	

Date: 07/19/99	Response Unit: PPM		
Z1 = 0.2335	R1 = 48.805	T1 = 81.051	
R2 = 48.938	Z2 = -0.005	T2 = 81.173	
Z3 = 0.1145	T3 = 81.120	R3 = 48.957	
Avg. Concentration:	81.11	PPM	

Concentration = A + Bx + Cx ² + Dx ³ + Ex ⁴	
r = 0.999990	
Constants:	A = 0.000000
B = 1.000000	C = 0.000000
D = 0.000000	E = 0.000000

APPROVED BY:

B.M. Becton

RATA CLASS



Scott Specialty Gases

Dual-Analyzed Calibration Standard

1750 EAST CLUB BLVD, DURHAM, NC 27704

Phone: 919-220-0803

Fax: 919-220-0808

CERTIFICATE OF ACCURACY: EPA Protocol Gas

Assay Laboratory

SCOTT SPECIALTY GASES
1750 EAST CLUB BLVD
DURHAM, NC 27704

P.O. No.: N31923
Project No.: 12-33126-001

Customer

TAMPA ELECTRIC CO
RAY MCDARBY
5010 CAUSEWAY BLVD
TAMPA FL 33619

ANALYTICAL INFORMATION

This certification was performed according to EPA Traceability Protocol For Assay & Certification of Gaseous Calibration Standards; Procedure #G1; September, 1997.

Cylinder Number: ALM020393 Certification Date: 3/11/99 Exp. Date: 3/11/2002
Cylinder Pressure***: 2015 PSIG

<u>COMPONENT</u>	<u>CERTIFIED CONCENTRATION</u>	<u>ANALYTICAL ACCURACY**</u>	<u>TRACEABILITY</u>
OXYGEN	11.96 %	+/- 1%	NIST
NITROGEN	BALANCE		

*** Do not use when cylinder pressure is below 150 psig.

** Analytical accuracy is inclusive of usual known error sources which at least include precision of the measurement processes.

Product certified as +/- 1% analytical accuracy is directly traceable to NIST standards.

REFERENCE STANDARD

<u>TYPE/SRM NO.</u>	<u>EXPIRATION DATE</u>	<u>CYLINDER NUMBER</u>	<u>CONCENTRATION</u>	<u>COMPONENT</u>
NTRM 2658	1/02/01	ALM031884	9.680 %	OXYGEN

INSTRUMENTATION

<u>INSTRUMENT/MODEL/SERIAL#</u>	<u>DATE LAST CALIBRATED</u>	<u>ANALYTICAL PRINCIPLE</u>
VARIAN/3400/16804-02	02/22/99	GC / TCD

ANALYZER READINGS

(Z = Zero Gas R = Reference Gas T = Test Gas r = Correlation Coefficient)

First Triad Analysis

Second Triad Analysis

Calibration Curve

OXYGEN

Date: 03/11/99	Response Unit: AREA	
Z1 = 0.0000	R1 = 247696	T1 = 306452
R2 = 248148	Z2 = 0.0000	T2 = 306564
Z3 = 0.0000	T3 = 306567	R3 = 248251
Avg. Concentration:	11.96	%

--

Concentration = A + Bx + Cx ² + Dx ³ + Ex ⁴	
r = 0.99999	
Constants:	A = 0.00
B = 1.00	C = 0.00
D = 0.00	E = 0.00

Special Notes:

APPROVED BY: B. M. Becton
B.M. BECTON



Scott Specialty Gases

1750 EAST CLUB BLVD, DURHAM, NC 27704

COMPLIANCE CLASS

Dual-Analyzed Calibration Standard

Phone: 919-220-0803

Fax: 919-220-0808

CERTIFICATE OF ACCURACY: EPA Protocol Gas

Assay Laboratory

SCOTT SPECIALTY GASES
1750 EAST CLUB BLVD
DURHAM, NC 27704

P.O. No.: EN31293
Project No.: 12-32820-001

Customer

TAMPA ELECTRIC CO
RAY MCDARBY
5010 CAUSEWAY BLVD
TAMPA FL 33619

ANALYTICAL INFORMATION

This certification was performed according to EPA Traceability Protocol For Assay & Certification of Gaseous Calibration Standards; Procedure #G1; September, 1997.

Cylinder Number: AAL15873 Certification Date: 2/23/99 Exp. Date: 2/22/2002
Cylinder Pressure***: 2000 PSIG

<u>COMPONENT</u>	<u>CERTIFIED CONCENTRATION</u>	<u>ANALYTICAL ACCURACY**</u>	<u>TRACEABILITY</u>
OXYGEN	23.1 %	+/- 2%	NIST
NITROGEN	BALANCE		

*** Do not use when cylinder pressure is below 150 psig.

** Analytical accuracy is inclusive of usual known error sources which at least include precision of the measurement processes.

REFERENCE STANDARD

<u>TYPE/SRM NO.</u>	<u>EXPIRATION DATE</u>	<u>CYLINDER NUMBER</u>	<u>CONCENTRATION</u>	<u>COMPONENT</u>
NTRM 2659	1/02/01	ALM031720	20.72 %	OXYGEN

INSTRUMENTATION

<u>INSTRUMENT/MODEL/SERIAL#</u>	<u>DATE LAST CALIBRATED</u>	<u>ANALYTICAL PRINCIPLE</u>
VARIAN/3400/16804-02	02/22/99	GC / TCD

Sil #2

Special Notes:

APPROVED BY: B. M. Becton
B.M. BECTON

APPENDIX D-4
CONVERTER EFFICIENCY RESULTS

TO: Quality Assurance File

FROM: R.A. Mc Darby

DATE: 27, August, 1999

SUBJECT: NO2 to NO Converter Efficiency Test
40 CFR 60, Appendix A, Method 20
Section 5.6
Analyzer S/N 10A/R-22525-205

The following results detail the performance of the converter efficiency test on analyzer S/N 10A/R-22525-205:

Highest value recorded during the 30 minute test run =	61.4 ppm
Value recorded at the end of the 30 minute test run =	61.4 ppm
Percent of decrease =	0.0 %

These results indicate that the converter currently installed in the referenced analyzer meets the requirements of 40 CFR 60, Appendix A, Reference Method 20, Section 5.6.

In accordance with the instructions contained in 40 CFR 60, Appendix A, Reference Method 20, sub-section 5.6.1; A sample was prepared using gas cylinder S/N ALM-019127 (certificate attached), diluted approximately 1:1 with 20.9% purified air. The sample was introduced into the analyzer through the sample port, and allowed to run for 30 minutes (12:26 – 12:56).

Raymond A. Mc Darby
Senior Environmental Technician
Corporate Environmental Services
Air Services

APPENDIX E

PROJECT PARTICIPANTS

TEST PARTICIPANTS

Corporate Environmental Services

Craig Coronado

Associate Technician

David Smith

Senior Environmental Technician

Environmental Planning

Shannon Todd

Engineer

Polk Power Station

David Knapp

Environmental and Safety
Engineer